



sub US seq list.ST25

SEQUENCE LISTING

<110> Hotez, Peter
Ashcom, James
Bdamchian, Mahnaz
Zhan, Bin
Wang, Yan
Hawdon, John
Loukas, Alexander
Williamson, Angela
Jones, Brian
Bethony, Jeffrey
Goud, Gaddam
Botazzi, Maria E.
Mendez, Susana

<120> Hookworm Vaccine

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<141> 2004-04-16

<150> US 60/329,533
<151> 2001-10-17

<150> US 60/332,007
<151> 2001-11-23

<150> US 60/375,404
<151> 2002-04-26

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<170> PatentIn version 3.3

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<212> PRT

<213> Necator americanus

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35 40 45

Arg Arg Val Ala Lys Gly Leu Glu Asp Ser Asn Ser Gly Lys Leu Asn

50 55 60

Pro Ala Lys Asn Met Tyr Lys Leu Ser Trp Asp Cys Ala Met Glu Gln

65 70 75 80

Gln Leu Gln Asp Ala Ile Gln Ser Cys Pro Ser Gly Phe Ala Gly Ile

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Gln Gly Val Ala Gln Asn Thr Met Ser Trp Ser Ser Ser Gly Gly Tyr

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Pro Asp Pro Ser Val Lys Ile Glu Pro Thr Leu Ser Gly Trp Trp Ser

115 120 125

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Gly Leu Phe Ala Phe Ser Asn Met Val Tyr Ser Glu Thr Thr Lys Leu
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Gly Cys Ala Tyr Lys Val Cys Gly Thr Lys Leu Ala Val Ser Cys Ile
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Tyr Asn Gly Val Gly Tyr Ile Thr Asn Gln Pro Met Trp Glu Thr Gly
180 185 190

Gln Ala Cys Gln Thr Gly Ala Asp Cys Ser Thr Tyr Lys Asn Ser Gly
195 200 205

Cys Glu Asp Gly Leu Cys Thr Lys Gly Pro Asp Val Pro Glu Thr Asn
210 215 220

Gln Gln Cys Pro Ser Asn Thr Gly Met Thr Asp Ser Val Arg Asp Thr
225 230 235 240

Phe Leu Ser Val His Asn Glu Phe Arg Ser Ser Val Ala Arg Gly Leu
245 250 255

Glu Pro Asp Ala Leu Gly Gly Asn Ala Pro Lys Ala Ala Lys Met Leu
260 265 270

Lys Met Val Tyr Asp Cys Glu Val Glu Ala Ser Ala Ile Arg His Gly
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Asn Lys Cys Val Tyr Gln His Ser His Gly Glu Asp Arg Pro Gly Leu
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Gly Glu Asn Ile Tyr Lys Thr Ser Val Leu Lys Phe Asp Lys Asn Lys

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Gly Val Gly Pro Ser Asn Val Leu Thr Thr Ala Leu Trp Asn Arg Pro
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Asn Met Gln Ile Gly His Tyr Thr Gln Met Ala Trp Asp Thr Thr Tyr
 355 360 365

Lys Leu Gly Cys Ala Val Val Phe Cys Asn Asp Phe Thr Phe Gly Val
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Cys Gln Tyr Gly Pro Gly Gly Asn Tyr Met Gly His Val Ile Tyr Thr
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<213> Necator americanus

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<210> 4

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<212> PRT

<213> Necator americanus

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35 40 45

Gly Lys Lys Val Thr Ala Phe Leu Gly Val Pro Tyr Gly Gln Pro Pro
50 55 60

Thr Gly Glu Leu Arg Phe Ser Asn Pro Lys Met Val Gln Arg Trp Glu
65 70 75 80

Gly Ile Lys Asn Ala Thr Thr Pro Ala Gln Pro Cys Phe His Phe Pro
85 90 95

Asp Ser Lys Phe Lys Gly Phe Arg Gly Ser Glu Met Trp Asn Pro Lys
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195 200 205

Ser Phe Gly Gly Asp Pro Arg Lys Val Thr Leu Phe Gly Glu Ala Ser
210 215 220

Gly Ala Ala Ser Ala Thr Ala His Leu Ala Ala Pro Gly Ser Tyr Glu
225 230 235 240

Phe Phe Asp Lys Ile Ile Gly Asn Gly Gly Thr Ile Met Asn Ser Trp
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Ala Ser Arg Thr Asn Thr Ser Met Leu Glu Leu Ser Met Lys Leu Ala
260 265 270

Glu Arg Leu Asn Cys Thr Lys Lys Arg Lys Asp Pro Asn Thr Val His
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325 330 335

Arg Asp Lys Asp Ile Lys Lys Asn Val Ser Ile Val Leu Gly Thr Val
340 345 350

Lys Asp Glu Ala Thr Phe Phe Leu Pro Tyr Tyr Phe Gly His Asn Gly
355 360 365

Phe Ser Phe Asn Asn Ser Phe Leu Ala Asp Gly Glu Glu Asn Arg Ala
370 375 380

Leu Ile Asn Ile Ser Gln Tyr Asn Tyr Ala Met Asn Ala Thr Ala Pro
385 390 395 400

Ser Leu Glu Ser Ser Leu Glu Pro Leu Leu Glu Ala Tyr Lys Asn Val
405 410 415

Ser Thr Arg Lys Glu Glu Gly Glu Arg Leu Arg Asp Gly Val Gly Arg
420 425 430

Phe Met Gly Asp Tyr Phe Tyr Thr Cys Ser Val Ile Asp Phe Ala Asn
435 440 445

Ile Val Ser Asp Ile Ile Asn Gly Ser Leu Tyr Met Tyr Tyr Phe Thr
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Met Ser Phe Trp Lys Asp Phe Ile Lys Thr Gly Val Pro Val Asp Phe
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Trp Pro Lys Tyr Asp Arg Lys Glu Arg Lys Ala Leu Val Leu Gly Glu
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Glu Ser Val Asn Asn Ser Tyr Pro Asn Met Thr Asn Val His Gly Pro
545 550 555 560

Tyr Cys Glu Leu Ile Glu Glu Ala Lys Ala Ser Thr Asn Asn Gly Leu
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<211> 1344

<212> DNA

<213> Necator americanus

<400> 5

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<212> PRT

<213> Necator americanus

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Met Lys Tyr Gln Cys Val Gly Arg Val Ser Asp Ile Trp Ala Asp Val
35 40 45

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Gln Val Ile Ala Phe Ile Thr Ala Thr Thr Lys Lys Met Thr Ile Gly
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Gln Asp Glu Lys Gln Thr Arg Val Gly Phe Ile Thr Tyr Gly Glu Glu
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130 135 140

His Arg Pro Asn Val Pro Lys Val Met Val Ile Val Ala Asn Gly Leu
145 150 155 160

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Lys Lys Gly Ser Gln Asn Pro Ile Pro Val Ala Thr Ala Phe Lys Asp
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Gln Val Pro Ile Leu Lys Lys Ile Ala Ser Glu Gly Tyr Asn Ile Arg
195 200 205

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210 215 220

Gln Ala Asn Cys Phe Cys Pro Asp His Tyr Val Pro Phe Arg Val Asn
225 230 235 240

Asn Pro Glu Phe Gly Cys Phe Val Thr Ala Lys Ile Pro Ser Met Trp
245 250 255

Arg Asp Ala Ala Glu Met Cys Arg Ala Val Glu Glu Gly Lys Leu Val
260 265 270

Lys Val Glu Asn Glu Glu Lys Ala Ala Phe Ile Met Lys Leu Val Gly
275 280 285

Pro Lys Lys Glu Ala Trp Ile Gly Leu Arg Tyr Tyr Gly Asn Lys Phe
290 295 300

Gln Trp Thr Asp Gly Thr Lys Leu Asn Ala Asp Asp Phe Asn Leu Trp
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325 330 335

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Glu Asp Met Arg Tyr Val Cys Glu Val Gln Pro Cys Ser Ala Ser Asn
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<210> 7

<211> 1442

<212> DNA

<213> Necator americanus

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<212> PRT

<213> Necator americanus

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35 40 45

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Gly Ser Trp Glu Asp Tyr Gln Lys Gln Arg Tyr His Tyr Arg Lys Lys
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Ile Leu Ala Lys Tyr Ala Ala Asn Lys Ala Ser Lys Leu Gln Ser Ala
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Gly Val Ile Gln Ile Gly Thr Pro Ala Gln Asn Phe Thr Val Ile Phe
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Asp Thr Gly Ser Ser Asn Leu Trp Val Pro Ser Arg Lys Cys Pro Phe
115 120 125

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145 150 155 160

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195 200 205

Pro Glu Ile Ala Val Leu Gly Val Thr Pro Val Phe His Thr Phe Ile
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sub US seq list.ST25

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 260 265 270

Gly Tyr Trp Gln Phe Lys Met Asp Met Val Gln Gly Gly Ser Ser Ser
 275 280 285

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385 390 395 400

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<212> DNA

<213> Necator americanus

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<210> 10

<211> 425

<212> PRT

<213> Necator americanus

<400> 10

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 20 25 30

Met Leu Arg Ala Gly Thr Trp Glu Thr Tyr Val Glu Gly Met Arg Lys
 35 40 45

Arg Gln Leu Gln Leu Leu Lys Glu His Lys Val His Ile Gln Asp Val
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Leu Gly Tyr Ala Asn Met Glu Tyr Leu Gly Glu Ile Thr Ile Gly Thr
 65 70 75 80

sub US seq list.ST25

Pro Gln Gln Lys Phe Leu Val Val Leu Asp Thr Gly Ser Ser Asn Leu
85 90 95

Trp Val Pro Asp Asp Ser Cys Tyr Lys Glu Lys Arg Pro Asp Arg Cys
100 105 110

Leu Val Ser Asn Cys Asp Ala Gly Leu Val Cys Gln Val Phe Cys Pro
115 120 125

Asp Pro Lys Cys Cys Glu His Thr Arg Glu Phe Lys Gln Val Asn Ala
130 135 140

Cys Lys Asp Lys His Arg Phe Asp Gln Lys Asn Ser Asn Thr Tyr Val
145 150 155 160

Lys Thr Asn Lys Thr Trp Ala Ile Ala Tyr Gly Thr Gly Asp Ala Arg
165 170 175

Gly Phe Phe Gly Arg Asp Thr Val Arg Leu Gly Ala Glu Gly Lys Asp
180 185 190

Gln Leu Val Ile Asn Asp Thr Trp Phe Gly Gln Ala Glu His Ile Ala
195 200 205

Glu Phe Phe Ser Asn Thr Phe Leu Asp Gly Ile Leu Gly Leu Ala Phe
210 215 220

Gln Glu Leu Ser Glu Gly Gly Val Ala Pro Pro Ile Ile Arg Ala Ile
225 230 235 240

Asp Leu Gly Leu Leu Asp Gln Pro Ile Phe Thr Val Tyr Phe Glu Asn
245 250 255

sub US seq list.ST25

Val Gly Asp Lys Glu Gly Val Tyr Gly Gly Val Phe Thr Trp Gly Gly
260 265 270

Leu Asp Pro Asp His Cys Glu Asp Glu Val Thr Tyr Glu Gln Leu Thr
275 280 285

Glu Ala Thr Tyr Trp Gln Phe Arg Leu Lys Gly Val Ser Ser Lys Asn
290 295 300

Phe Ser Ser Thr Ala Gly Trp Glu Ala Ile Ser Asp Thr Gly Thr Ser
305 310 315 320

Leu Asn Gly Ala Pro Arg Gly Ile Leu Arg Ser Ile Ala Arg Gln Tyr
325 330 335

Asn Gly Gln Tyr Val Ala Ser Gln Gly Leu Tyr Val Val Asp Cys Ser
340 345 350

Lys Asn Val Thr Val Asp Val Thr Ile Gly Asp Arg Asn Tyr Thr Met
355 360 365

Thr Ala Lys Asn Leu Val Leu Glu Ile Gln Ala Asp Ile Cys Ile Met
370 375 380

Ala Phe Phe Glu Met Asp Met Phe Ile Gly Pro Ala Trp Ile Leu Gly
385 390 395 400

Asp Pro Phe Ile Arg Glu Tyr Cys Asn Ile His Asp Ile Glu Lys Lys
405 410 415

Arg Ile Gly Phe Ala Ala Val Lys His
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sub US seq list.ST25

<210> 11

<211> 509

<212> DNA

<213> Ancylostoma caninum

<400> 11

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agcataatta agttataag cccaaagata ggagtatccc aatcgaactc ttctcatgga 240

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gtaaagtac ggattatggc gacggtgatt tggtaatttc tgtttcacgg tgcgacctc 360

tccgaaactg gacagacgtc tctggagagg agaagaaatt gctcggaacg ttcaaatgtg 420

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<210> 12

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<212> PRT

<213> Ancylostoma caninum

<400> 12

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35 40 45

Gly Tyr Phe Ile Tyr Tyr Asp Leu Glu His Lys Glu Val Tyr Lys Pro

sub US seq list.ST25

50 55 60

Lys Asp Arg Ser Ile Pro Ile Glu Leu Phe Ser Trp Arg Glu Lys Glu
65 70 75 80

Asn Cys Gly Met Pro Asp Leu Glu Glu Gly Lys Glu Tyr Leu Ile Gly
85 90 95

Gly Lys Val Thr Asp Tyr Gly Asp Gly Asp Leu Val Ile Ser Val Ser
100 105 110

Arg Cys Asp Leu Leu Arg Asn Trp Thr Asp Val Ser Gly Glu Glu Lys
115 120 125

Lys Leu Leu Gly Thr Phe Lys Cys Glu Asn Gln Ser
130 135 140

<210> 13

<211> 2615

<212> DNA

<213> Ancylostoma caninum

<400> 13

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gttttgaaa aagaggagtt agcagcaaag ttgaagaaaa caccatata ggaggtggat 180

gagcaaacag ttagacaatc gtcggttatg aaactcagga atatcaaaaa tgccctgttc 240

actccaatag aaccagtagc ctcagcgttg cctccattgc gtgtgaatga cccgaaatat 300

tgtccgagtt acggtgaacc ggataagaaa tatgcctatc aggaagcagc atcttatctt 360

ctcagtggtc tggatcagac ttagatcca tgcgaggatc tctatgcatt cacctgtaat 420

acgtacctca gaaatcaca cgccaccgac attggcgtga accgaatcgg aacgtacaaa 480

sub US seq list.ST25

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sub US seq list.ST25

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<210> 14
 <211> 869
 <212> PRT
 <213> Ancylostoma caninum

<400> 14

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Leu Asn Glu Asn Lys Asp Asp Ser Ser Pro Ala Pro Lys Ile Trp Asn
 35 40 45

sub US seq list.ST25

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50 55 60

Glu Lys Glu Glu Leu Ala Ala Lys Leu Lys Lys Thr Pro Tyr Glu Glu
65 70 75 80

Val Asp Glu Gln Thr Val Arg Gln Ser Ser Val Met Lys Leu Arg Asn
85 90 95

Ile Lys Asn Ala Leu Phe Thr Ile Glu Pro Val Ala Ser Ala Leu Pro
100 105 110

Pro Leu Arg Val Asn Asp Pro Lys Tyr Cys Pro Ser Tyr Gly Glu Pro
115 120 125

Asp Lys Lys Tyr Ala Tyr Gln Glu Ala Ala Ser Tyr Leu Leu Ser Gly
130 135 140

Leu Asp Gln Thr Val Asp Pro Cys Glu Asp Leu Tyr Ala Phe Thr Cys
145 150 155 160

Asn Thr Tyr Leu Arg Asn His Asn Ala Thr Asp Ile Gly Val Asn Arg
165 170 175

Ile Gly Thr Tyr Lys Asp Ala Gln Asp Asp Val Asn Ala Glu Ile Val
180 185 190

Glu Ala Leu Glu Glu Val Asn Val Ser Asp Thr Lys Trp Ser Glu Thr
195 200 205

Glu Arg Leu Val Lys Ala Thr Leu Phe Thr Cys Val His His Thr Arg
210 215 220

sub US seq list.ST25

Ala Arg Lys Pro Ile Asp Asn Ser Lys Asn Val Leu Ile Glu Met Arg
225 230 235 240

Asp Leu Phe Gly Gly Ile Pro Phe Leu Asn His Thr Leu Lys Lys Asp
 245 250 255

Ile Asp Phe Phe Asp Ile Met Gly Lys Phe Glu Gln Asn His Ala Met
 260 265 270

Gly Thr Leu Leu Gly Ala Met Val Ser Val Asp Phe Lys Asn Val Asn
 275 280 285

Lys His Ser Leu Phe Leu Ser Gln Pro Tyr Leu Pro Met Ala Arg Asp
 290 295 300

Phe Tyr Val Phe Pro Gln His Thr Lys Met Val Glu Asn Arg Val Ser
305 310 315 320

Leu Ile Asn Ser Val Leu Arg Ser Phe Ala Glu Ala Val Leu Asp Asp
 325 330 335

Pro Ser Pro Tyr Leu Asp Leu Met Ser Arg Ser Ala Arg Asp Val Val
 340 345 350

Lys Leu Glu Met Gln Ile Ala Met Ala Ser Trp Pro Glu Ser Glu Leu
 355 360 365

Arg Asn Tyr Ala Gln Gln His Asn Pro Arg Thr Leu Asn Gln Leu Lys
 370 375 380

Ala Ala Tyr Pro Ala Ile Lys Trp Asp Ser Tyr Phe Asn Ala Leu Leu
385 390 395 400

sub US seq list.ST25

Ser Ser Val Gln Gly Val Asp Met Asn Arg Gln Asn Ile Ile Leu Thr
405 410 415

Gln Pro Ser Tyr Phe Gly Trp Leu Asn Ala Leu Phe Asn Gly Gly Ala
420 425 430

Asp Asp Lys Thr Ile Ala Asn Tyr Leu Leu Val His Leu Ile Leu Glu
435 440 445

Glu Ala Asp Phe Leu Gly Gly Ala Leu Lys Thr Met Val Gln Lys Ser
450 455 460

Asp Tyr Val Pro Tyr Ala Leu Gly Arg Gly Lys Gly Val Thr Arg Val
465 470 475 480

Gly Gln Gln Leu Thr Arg Ser His Asp Asp Thr Val Glu Asp Ala Asn
485 490 495

Ile Gln Cys Leu Asn Ser Met Met Thr Tyr Met Pro Phe Gly Pro Gly
500 505 510

Tyr Val Tyr Val Lys Ser Arg Lys Asn Arg Asp Asp Val Val Lys Asp
515 520 525

Ile Glu His Gln Thr Glu Leu Val Phe Lys Asn Phe Val Asn Met Ile
530 535 540

Gly Asn Leu Asn Trp Met Thr Asp Ala Ser Leu Glu Leu Ala Met Glu
545 550 555 560

Lys Ala Asp Thr Met Val Lys Asn Tyr Gly Trp Pro Lys Asp Leu Phe
565 570 575

Gly Asn Phe Arg Asp Ser Ser Lys Ile Asp Ala Tyr His Lys Lys Asp

580 585 590

Tyr Gly Asn Ile Ile Asn Leu Tyr Lys Glu Asn Ile Thr His Asn Tyr
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Tyr His Ile Arg Arg Thr Met Ile Lys Gly Tyr Ser Asn His Glu Ser
610 615 620

Leu Arg Leu Leu Thr Glu Ala Pro Lys Arg Asp His Phe Leu Leu Ser
625 630 635 640

Pro Ala Leu Val Asn Ala Trp Tyr Ile Pro Glu Arg Asn Ser Ile Ala
645 650 655

Phe Pro Tyr Ala Phe Trp Asn Pro Pro Tyr Tyr Asn Tyr Glu Tyr Pro
660 665 670

Gln Ala Cys Asn Tyr Ala Gly Gln Gly Gly Thr Ala Gly His Glu Leu
675 680 685

Val His Gly Phe Asp Asp Gln Gly Val Gln Phe Ala Ala Asp Gly Ser
690 695 700

Leu Ser Asp Cys Thr Trp Ile Glu Cys Gly Trp Leu Glu Glu Lys Ser
705 710 715 720

Lys Lys Gly Phe Ser Asp Met Ala Gln Cys Val Val Thr Gln Tyr Ser
725 730 735

Thr Gln Cys Cys Pro Gln Thr Gly Gly Val Thr His Cys Ala Asn Gly
740 745 750

Ala Thr Thr Gln Gly Glu Asn Ile Ala Asp Leu Gly Gly Gln Leu Ala
755 760 765

sub US seq list.ST25

Ala Tyr Arg Ala Tyr Arg Glu Tyr Ile Thr Lys Glu Arg Gly Glu Glu
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Glu Lys Arg Leu Pro Gly Leu Glu Gln Tyr Thr Pro Asn Gln Ile Phe
785 790 795 800

Trp Ile Thr Tyr Gly Tyr Ser Trp Cys Met Ser Gln Thr Asp Ser Ser
805 810 815

Leu Ile Arg Gln Leu Leu Thr Asp Val His Ser Pro Gly Ser Cys Arg
820 825 830

Val Asn Gln Val Met Gln Asp Ile Pro Glu Phe Ala Leu Asp Phe Gly
835 840 845

Cys Thr Met Gly Gln Lys Met Tyr Pro Glu Pro Glu Gln Arg Cys Pro
850 855 860

Val Trp Val Ala Glu
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<210> 15

<211> 1722

<212> DNA

<213> Ancylostoma caninum

<400> 15

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ctaagggaaa aaataaaagc aaagctgacg ctctctccag cacgaaaggc tatattggac 240

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sub US seq list.ST25

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sub US seq list.ST25

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<210> 16

<211> 536

<212> PRT

<213> Ancylostoma caninum

<400> 16

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35 40 45

Lys Phe Ile Arg Leu Arg Glu Lys Ile Lys Ala Lys Leu Thr Leu Ser
50 55 60

Pro Ala Arg Lys Ala Ile Leu Asp Glu Val Met Lys His Ile Lys Met
65 70 75 80

Ile Lys Lys Asp Lys Ile Gln Glu Lys Gly Asp Ser Ile Asp Glu Ile
85 90 95

Asn Glu Lys Ser Ala Ile Gly Gln Leu Leu Tyr Gln Gly Asp Ile Val
100 105 110

Leu Thr Glu Lys Gln Ala Gln Gln Ile Thr Glu Asp Ile Glu Asn Asp
115 120 125

Lys Gly Asp Arg Glu Lys Arg Gln Ala Phe Arg Asp Arg Asn Tyr Pro

sub US seq list.ST25

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Arg Thr Leu Trp Ser Lys Gly Val Tyr Phe His Phe His Arg Asn Ala
145 150 155 160

Thr Pro Glu Val Arg Ser Val Phe Val Lys Gly Ala Lys Leu Trp Met
165 170 175

Lys Asp Thr Cys Ile Asp Phe Phe Glu Ser Asn Ser Ala Pro Asp Arg
180 185 190

Ile Arg Val Phe Lys Glu Asn Gly Cys Trp Ser Tyr Val Gly Arg Leu
195 200 205

Gly Gly Glu Gln Asp Leu Ser Leu Gly Glu Gly Cys Gln Ser Val Gly
210 215 220

Thr Ala Ala His Glu Ile Gly His Ala Ile Gly Phe Tyr His Thr His
225 230 235 240

Ala Arg His Asp Arg Asp Asn Phe Ile Thr Phe Asn Ala Gln Asn Val
245 250 255

Lys Pro Asp Trp Leu Asp Gln Phe Thr Leu Gln Thr Pro Ala Thr Asn
260 265 270

Glu Asn Tyr Gly Ile Thr Tyr Asp Tyr Gly Ser Ile Met His Tyr Gly
275 280 285

Ala Asn Ser Ala Ser Gln Asn Gly Arg Pro Thr Met Val Pro His Asp
290 295 300

Pro Lys Tyr Val Glu Thr Leu Gly Ile Asn Lys His Tyr Asp Cys Thr
305 310 315 320

sub US seq list.ST25

Lys Asn Cys Asp Pro Ala Thr Ser Ala Gln Cys Lys Met Gly Gly Phe
325 330 335

Pro His Pro Arg Asp Cys Thr Arg Cys Ile Cys Pro Ser Gly Tyr Gly
340 345 350

Gly Lys Leu Cys Asp Gln Lys Pro Ala Gly Cys Gly Ser Ile Tyr Gln
355 360 365

Ala Thr Asn Gln Tyr Gln Thr Leu His Asp Glu Ile Gly Asp Lys Arg
370 375 380

Ala Gly Gln Arg Pro Arg Glu Asp Met Asp Phe Cys Tyr Tyr Trp Ile
385 390 395 400

Thr Ala Pro Lys Gly Ser Lys Ile Glu Ile Lys Ile Ala Gly Leu Ser
405 410 415

Gln Gly Ala Ala Val Glu Gly Cys Gln Tyr Trp Gly Val Glu Ile Lys
420 425 430

Thr His Ala Asp Gln Arg Leu Thr Gly Tyr Arg Phe Cys Ala Pro Glu
435 440 445

Asp Val Gly Val Arg Leu Val Ser Asn Phe Asn Ile Val Pro Ile Ile
450 455 460

Thr Tyr Asn Ile Phe Tyr Ala Thr Tyr Val Asp Ile Gln Tyr Arg Ile
465 470 475 480

Val Gly Asp Asn Val Gly Gly Pro Met Pro Gln Pro Gln Pro Asn Ser
485 490 495

sub US seq list.ST25

Asn Cys Val Asp Asn Glu Gln Cys Ala Thr Leu Val Arg Thr Lys Asn
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Pro Lys Ser Ser Gly Phe Cys Arg
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<210> 17
<211> 1328
<212> DNA
<213> Ancylostoma caninum

<400> 17
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sub US seq list.ST25

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<210> 18

<211> 424

<212> PRT

<213> Ancylostoma caninum

<400> 18

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20 25 30

Thr Asp Lys Asp Arg Gln Ala Phe Leu Asp Phe His Asn Asn Ala Arg
35 40 45

Arg Arg Val Ala Lys Gly Val Glu Asp Ser Asn Ser Gly Lys Leu Asn
50 55 60

Pro Ala Lys Asn Met Tyr Lys Leu Ser Trp Asp Cys Ala Met Glu Gln

sub US seq list.ST25

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Gln Gly Val Ala Gln Asn Val Met Ser Trp Ser Ser Ser Gly Gly Phe			
	100	105	110
Pro Asp Pro Ser Val Lys Ile Glu Gln Thr Leu Ser Gly Trp Trp Ser			
	115	120	125
Gly Ala Lys Lys Asn Gly Val Gly Pro Asp Asn Lys Tyr Asn Gly Gly			
	130	135	140
Gly Leu Phe Ala Phe Ser Asn Met Val Tyr Ser Glu Thr Thr Lys Leu			
	145	150	155
Gly Cys Ala Tyr Lys Val Cys Gly Thr Lys Leu Ala Val Ser Cys Ile			
	165	170	175
Tyr Asn Gly Val Gly Tyr Ile Thr Asn Gln Pro Met Trp Glu Thr Gly			
	180	185	190
Gln Ala Cys Lys Thr Gly Ala Asp Cys Ser Thr Tyr Lys Asn Ser Gly			
	195	200	205
Cys Glu Asp Gly Leu Cys Thr Lys Gly Pro Asp Val Pro Glu Thr Asn			
	210	215	220
Gln Gln Cys Pro Ser Asn Thr Gly Met Thr Asp Ser Val Arg Asp Thr			
	225	230	235
Phe Leu Ser Val His Asn Glu Phe Arg Ser Ser Val Ala Arg Gly Leu			
	245	250	255

sub US seq list.ST25

Glu Pro Asp Ala Leu Gly Gly Asn Ala Pro Lys Ala Ala Lys Met Leu
260 265 270

Lys Met Val Tyr Asp Cys Glu Val Glu Ala Ser Ala Ile Arg His Gly
275 280 285

Asn Lys Cys Val Tyr Gln His Ser His Gly Glu Asp Arg Pro Gly Leu
290 295 300

Gly Glu Asn Ile Tyr Lys Thr Ser Val Leu Lys Phe Asp Lys Asn Lys
305 310 315 320

Ala Ala Lys Gln Ala Ser Gln Leu Trp Trp Asn Glu Leu Lys Glu Phe
325 330 335

Gly Val Gly Pro Ser Asn Val Leu Thr Thr Ala Leu Trp Asn Arg Pro
340 345 350

Gly Met Gln Ile Gly His Tyr Thr Gln Met Ala Trp Asp Thr Thr Tyr
355 360 365

Lys Leu Gly Cys Ala Val Val Phe Cys Asn Asp Phe Thr Phe Gly Val
370 375 380

Cys Gln Tyr Gly Pro Gly Gly Asn Tyr Met Gly His Val Ile Tyr Thr
385 390 395 400

Met Gly Gln Pro Cys Ser Gln Cys Ser Pro Gly Ala Thr Cys Ser Val
405 410 415

Thr Glu Gly Leu Cys Ser Ala Pro
420

sub US seq list.ST25

<210> 19

<211> 767

<212> DNA

<213> Ancylostoma caninum

<400> 19

cgacacaacc aacgatgta gttctgtac cacttttggc tctcttggt gtttctgtc 60

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tcgacgtgca caacagttac agatctatgg ttgccaagg acaggcaaag gatgcaattt 180

cgggaaatgc tccgaaggct gccaaaatga agaaaatgat ctacgactgc aacgtcgaat 240

caactgcaat gcaaaatgca aaaaaatgtg ttttcgcca ttgcacagg aaggaggtg 300

gcgaaaatat ttgatgtcg actgcgcgtc agatggacaa agcacaagct gctcaacagg 360

ctagtgcagg ttggttcagt gagcttgcga agtatggtgt aggccaggaa aacaagctaa 420

caacgcagtt gtggaacagg ggagttatga taggacatta cactcagatg gtctggcagg 480

agtcctacaa actcggatgt tatgtggaat ggtgttcac gatgacctat ggtgtctgcc 540

agtacagtcc tcagggtaat atgatgaact cactcatcta cgagaaagga aaccctgca 600

caaaagactc tgactgtggc tcgaacgcca gttgcagcgc tggggaggcg ctttgcgtcg 660

tgctgtggta gctggacatt cccaacgtac aacagcgta tagttaatgc aacttttctt 720

tcattctatt gagtaaaggc attgaaaaca aaaaaaaaaa aaaaaaa 767

<210> 20

<211> 218

<212> PRT

<213> Ancylostoma caninum

<400> 20

Met Leu Val Leu Val Pro Leu Leu Ala Leu Leu Ala Val Ser Val His

1 5 10 15

sub US seq list.ST25

Gly Asn Ser Met Arg Cys Gly Asn Asn Gly Met Thr Asp Glu Ala Arg
20 25 30

Gln Lys Phe Leu Asp Val His Asn Ser Tyr Arg Ser Met Val Ala Lys
35 40 45

Gly Gln Ala Lys Asp Ala Ile Ser Gly Asn Ala Pro Lys Ala Ala Lys
50 55 60

Met Lys Lys Met Ile Tyr Asp Cys Asn Val Glu Ser Thr Ala Met Gln
65 70 75 80

Asn Ala Lys Lys Cys Val Phe Ala His Ser His Arg Lys Gly Val Gly
85 90 95

Glu Asn Ile Trp Met Ser Thr Ala Arg Gln Met Asp Lys Ala Gln Ala
100 105 110

Ala Gln Gln Ala Ser Asp Gly Trp Phe Ser Glu Leu Ala Lys Tyr Gly
115 120 125

Val Gly Gln Glu Asn Lys Leu Thr Thr Gln Leu Trp Asn Arg Gly Val
130 135 140

Met Ile Gly His Tyr Thr Gln Met Val Trp Gln Glu Ser Tyr Lys Leu
145 150 155 160

Gly Cys Tyr Val Glu Trp Cys Ser Ser Met Thr Tyr Gly Val Cys Gln
165 170 175

Tyr Ser Pro Gln Gly Asn Asn Met Asn Ser Leu Thr Tyr Glu Lys Gly
180 185 190

Asn Pro Cys Thr Lys Asp Ser Asp Cys Gly Ser Asn Ala Ser Cys Ser

sub US seq list.ST25

195 200 205

Ala Gly Glu Ala Leu Cys Val Val Arg Gly
210 215

<210> 21

<211> 687

<212> DNA

<213> Ancylostoma caninum

<400> 21

ataagacagc aatgaagtcc tatctgtga taccagctgc gatcctcgcc attgcttatg 60

ccgatgctga ttattccaag tgcccgcgaa atgaaataat gaacaacgat atgaggggaaa 120

aagttacgga catgcacaac gcctacagat ccaaattcgc acgggatcat caagcttcga 180

aaatgagaaa attggtttac gactgtgcca tcgaaaaagg aatctacgag tcggatacca 240

agtgcgagat gaaaccatcg atggaggagg agaacgtaga agttatcgac ggcaacagcg 300

atgatctcac tgttatttca gaggccggta attcgtggtg gagcgagatt ttggacctga 360

aaggaaagga tgtgtacaac tccgtggaca atacatcgga aattgccaat atggcttggg 420

aaagtcatgc gaaacttggg tgcgcagttg ttgagtgtc caagaaaacc catgtagtct 480

gccgatacgg accggaagga aaaggtgaag gaaagaaaat ttacgaaaag ggcgaaacat 540

gctcacaatg cagtgtattc ggacaaggtg tcacctgtga caatgacgag tgggagggat 600

tactctgtc ataattttgg aaaaacatat gtggatgatg atgttcgca ataaataaat 660

caattacaaa aaaaaaaaaa aaaaaaa 687

<210> 22

<211> 200

<212> PRT

<213> Ancylostoma caninum

<400> 22

sub US seq list.ST25

Met Lys Ser Tyr Leu Val Ile Ser Ala Ala Ile Leu Gly Ile Ala Tyr
1 5 10 15

Ala Asp Ala Asp Tyr Ser Lys Cys Pro Gln Asn Glu Ile Met Asn Asn
20 25 30

Asp Met Arg Glu Lys Val Thr Asp Met His Asn Ala Tyr Arg Ser Lys
35 40 45

Phe Ala Arg Asp His Gln Ala Ser Lys Met Arg Lys Leu Val Tyr Asp
50 55 60

Cys Ala Ile Glu Lys Gly Ile Tyr Glu Ser Asp Thr Lys Cys Glu Met
65 70 75 80

Lys Pro Ser Met Glu Glu Glu Asn Val Glu Val Ile Asp Gly Asn Ser
85 90 95

Asp Asp Leu Thr Val Ile Ser Glu Ala Gly Asn Ser Trp Trp Ser Glu
100 105 110

Ile Leu Asp Leu Lys Gly Lys Asp Val Tyr Asn Ser Val Asp Asn Thr
115 120 125

Asp Glu Ile Ala Asn Met Ala Trp Glu Ser His Ala Lys Leu Gly Cys
130 135 140

Ala Val Val Glu Cys Ser Lys Lys Thr His Val Val Cys Arg Tyr Gly
145 150 155 160

Pro Glu Gly Lys Gly Glu Gly Lys Lys Ile Tyr Glu Lys Gly Glu Thr
165 170 175

Cys Ser Gln Cys Ser Asp Tyr Gly Gln Gly Val Thr Cys Asp Asn Asp

sub US seq list.ST25

180 185 190

Glu Trp Glu Gly Leu Leu Cys Ser
195 200

<210> 23

<211> 1689

<212> DNA

<213> Ancylostoma caninum

<400> 23

agaacatgat caacatccat ttcatagcgc ttgccataac ctctcttttg cctgccctat 60

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agaatacaat cgacaacaat gttcttaagc cgataaatac tcgtcgagag gctctggcca 180

agggcacgca acagaatggc ttgaccac caaaccaca aacattcttg ccaccagcga 240

cggacatgac taaactgagt tggagtgtg atcttgagca gaaggctata aaaactatca 300

acggtaactg tgtgaatccg gcaaaccaca ccaaaccgaa taacggcgaa ggattggcag 360

atgtcctcta ctacggcaac gactatgata acacggtcga aggagtgatc caaggcaatc 420

tcgaagcttg gctggtaaaa gccgatttca atgtattccc tgttaccaca aaaggtaccg 480

tcattagcta tcccacttac aatggcaaca cagatctctt ggcatactct aacttagtcc 540

ggcctaccaa tactgagata ggatgtgtac tggaaagatg tccagctaca gccaatgttc 600

caaagctagt cacgttctac tgtattttga atggaaaaa taccaccaac ggagaggctc 660

tctataaggg cacaactgtg aataccggag gatgcaaaga ggtcacatgc tcagcgggat 720

atgcctgtaa caacgccacc ttgctatgtg aacgtagtgc gacaacaagc tcattacat 780

cggcaagcac atcttcatca acagcttctt caacaagttc atctatggca ataagcatat 840

cttcgtcaac aagcgcattt ggggcaacaa caacaaaagc tccttctccg caagcgcaat 900

tccccacagg gactagcact atgtgcaata ccaggcatgc ctatgctaac aggatgaccg 960

sub US seq list.ST25

acaatctcag gaatgaatac gtaaggctgc acaacttcg aagaggctta ctcgcaaagg 1020
gagaaattcc tcagaagggt aacatatacc taccaaaggc ggctgacatg tggaaaatta 1080
gttacgactg cggcctggaa caaggagcca tagaacacgc aagccagtgt ctcacaggag 1140
gggccggaca aagctcgaga ccagggtgtgg gagagaactt taaagtgatc ccagcggcaa 1200
gatttccgac tticgaagat gcagcaaaaa agaccgttac tgaatgggtg aagccgattc 1260
gtaacgtgga ctacttcgga aacaacgtca acttctctcc catctatgac caagaccga 1320
tatcctcctt taccggatg gcatgggcca caactaaca ggtgggggtgc tctatcgtaa 1380
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gggtgtgacc agtcgaggga ttgtgttact aggcgcactt ttccgcactg aatggcgatt 1560
ctgttttgaa ttttgaata ttacattaat ggatgttaac aatgggtcct ttagtttct 1620
gttgtaaca aggggtggtta gattggattg ggaataaatg atgcaatcgc caaaaaaaaa 1680
aaaaaaaa 1689

<210> 24

<211> 508

<212> PRT

<213> Ancylostoma caninum

<400> 24

Met Ile Asn Ile His Phe Ile Ala Leu Ala Ile Thr Ser Leu Leu Pro
1 5 10 15

Ala Leu Ser Glu Gly Lys Pro Val Val Phe Val Glu Pro Gln Cys Lys
20 25 30

Pro Asn Gly Tyr Leu His Lys Asn Thr Ile Asp Asn Asn Val Leu Lys
35 40 45

sub US seq list.ST25

Pro Ile Asn Thr Arg Arg Glu Ala Leu Ala Lys Gly Thr Gln Gln Asn
50 55 60

Gly Phe Asp Pro Pro Asn Pro Gln Thr Phe Leu Pro Pro Ala Thr Asp
65 70 75 80

Met Thr Lys Leu Ser Trp Ser Cys Asp Leu Glu Gln Lys Ala Ile Lys
85 90 95

Thr Ile Asn Gly Asn Cys Val Asn Pro Ala Asn Pro Thr Lys Pro Asn
100 105 110

Asn Gly Glu Gly Leu Ala Asp Val Leu Tyr Tyr Gly Asn Asp Tyr Asp
115 120 125

Asn Thr Val Glu Gly Val Ile Gln Gly Asn Leu Glu Ala Trp Leu Val
130 135 140

Lys Ala Asp Phe Asn Val Phe Pro Val Thr Thr Lys Gly Thr Val Ile
145 150 155 160

Ser Tyr Pro Thr Tyr Asn Gly Asn Thr Asp Leu Leu Ala Tyr Ser Asn
165 170 175

Leu Val Arg Pro Thr Asn Thr Glu Ile Gly Cys Val Leu Glu Arg Cys
180 185 190

Pro Ala Thr Ala Asn Val Pro Lys Leu Val Thr Phe Tyr Cys Ile Leu
195 200 205

Asn Gly Lys Asn Ile Thr Asn Gly Arg Ala Leu Tyr Lys Gly Thr Thr
210 215 220

sub US seq list.ST25

Val Asn Thr Gly Gly Cys Lys Glu Val Thr Cys Ser Ala Gly Tyr Ala
225 230 235 240

Cys Asn Asn Ala Thr Leu Leu Cys Glu Arg Ser Ala Thr Thr Ser Ser
 245 250 255

Ser Thr Ser Ala Ser Thr Ser Ser Ser Thr Ala Ser Ser Thr Ser Ser
 260 265 270

Ser Asn Ala Ile Ser Thr Ser Ser Ser Thr Ser Ala Ser Gly Ala Thr
 275 280 285

Thr Thr Lys Ala Pro Ser Pro Gln Ala Gln Phe Pro Thr Gly Thr Ser
 290 295 300

Thr Met Cys Asn Thr Arg His Ala Tyr Ala Asn Arg Met Thr Asp Asn
305 310 315 320

Leu Arg Asn Glu Tyr Val Arg Leu His Asn Phe Arg Arg Gly Leu Leu
 325 330 335

Ala Lys Gly Glu Ile Pro Gln Lys Gly Asn Ile Tyr Leu Pro Lys Ala
 340 345 350

Ala Asp Met Trp Lys Ile Ser Tyr Asp Cys Gly Leu Glu Gln Gly Ala
 355 360 365

Ile Glu His Ala Ser Gln Cys Leu Thr Gly Gly Ser Gly Gln Ser Ser
 370 375 380

Arg Pro Gly Val Gly Glu Asn Phe Lys Val Ile Pro Ala Ala Arg Phe
385 390 395 400

Pro Thr Phe Glu Asp Ala Ala Lys Lys Thr Val Thr Glu Trp Trp Lys

sub US seq list.ST25

405 410 415

Pro Ile Arg Asn Val Asp Tyr Phe Gly Asn Asn Val Asn Phe Leu Pro
420 425 430

Ile Tyr Asp Gln Asp Pro Ile Ser Ser Phe Thr Arg Asn Ala Trp Ala
435 440 445

Thr Thr Asn Lys Val Gly Cys Ser Ile Val Lys Cys Thr Thr Asp Asn
450 455 460

Val Tyr Val Gly Val Cys Arg Tyr Ser Pro Met Gly Asn Ile Val Asn
465 470 475 480

Ser Asn Ile Tyr Gln Ile Gly Asn Pro Cys Ser Val Arg Pro Thr Gln
485 490 495

Ala Thr Gly Cys Asp Pro Val Glu Gly Leu Trp Tyr
500 505

<210> 25

<211> 1384

<212> DNA

<213> Ancylostoma caninum

<400> 25

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ctaacagatg ctgaacgcac actgctaact agggcgcaca attccattcg acgggaaata 180

gcgcaaggag ttgcaaacia ctaccatggt ggtaaactgc ctgctggaaa gaacatatac 240

aggatgagat acagctgtga gctggaacag gctgctattg atgctagtca aaccttctgt 300

tccgcatcat tggaggaacc acagaaatat ggacaaaaca tccaagcata cgtcacacca 360

sub US seq list.ST25

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cctgttatct actacggcca ggcgcacgcg gccaacaagt ttacggatcc gcgcttgta 480
acatttgcaa acctgccta cgacaagaac actgcacttg gctgtcacta tgcgaaatgt 540
caaggccctg acagaatcgt cattagtgc atgtacaaca acgtcgttcc tgacaacgca 600
gtgatctacg agcctggaac tgcttgcgta aaagatgcgg actgcactac ttatcctcag 660
tccacatgca aggacagcct ttgcattatt cctacgccac atccacaaaa tccaccaa 720
ccaccaccag caatgagtc aaacgctgaa atgactgatg cagcacgaaa gaaggtcctc 780
ggcatgcaca actggcgcag atcgcaggtc gctctgggaa acgttcaaaa cgggaaaaat 840
gcttacaact gccccactgc aacagacatg tacaagatag aatatgattg cgacctcgag 900
aacagcgctc tagcgtatgc aaagcaatgt agtctcgttg gttcagcaga aggaactcgt 960
ccaggagaag gcgagaatgt ccacaaaggc gctctcgtaa ccgatccgga ggctgcagtt 1020
cagaccgcag ttcaagcatg gtggagtc aa atctacaaa atggactcaa tgcacagatg 1080
aaattcactg ctttcttgaa ggacaagcct gacgctccga cagcgtttac acagatggcg 1140
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gtctgtagat acaaagctgc cggaacatc gtgggcgaat tcattctatac caagggaat 1260
gtatgcgacg cctgtaaagc cacatgcatt accgcggaag gtctttgccc aacgccttga 1320
tttactgg actgtttcac gaacagatca gataaatcgt ttcacaaaa aaaaaaaaaa 1380
aaaa 1384

<210> 26

<211> 424

<212> PRT

<213> Ancylostoma caninum

<400> 26

Met Pro Asn Leu Leu Leu Leu Phe Leu Ser Leu Pro Gly Ala Ile

sub US seq list.ST25

1 5 10 15

Leu Ser Thr Thr Cys Pro Gly Asn Asp Leu Thr Asp Ala Glu Arg Thr
20 25 30

Leu Leu Thr Arg Val His Asn Ser Ile Arg Arg Glu Ile Ala Gln Gly
35 40 45

Val Ala Asn Asn Tyr His Gly Gly Lys Leu Pro Ala Gly Lys Asn Ile
50 55 60

Tyr Arg Met Arg Tyr Ser Cys Glu Leu Glu Gln Ala Ala Ile Asp Ala
65 70 75 80

Ser Gln Thr Phe Cys Ser Ala Ser Leu Glu Glu Pro Gln Lys Tyr Gly
85 90 95

Gln Asn Ile Gln Ala Tyr Val Thr Pro Ser Ile Ile Ala Arg Pro Lys
100 105 110

Asn Asp Leu Leu Glu Asp Ala Val Lys Gln Trp Tyr Leu Pro Val Ile
115 120 125

Tyr Tyr Gly Gln Arg Asp Ala Ala Asn Lys Phe Thr Asp Pro Arg Leu
130 135 140

Tyr Thr Phe Ala Asn Leu Ala Tyr Asp Lys Asn Thr Ala Leu Gly Cys
145 150 155 160

His Tyr Ala Lys Cys Gln Gly Pro Asp Arg Ile Val Ile Ser Cys Met
165 170 175

Tyr Asn Asn Val Val Pro Asp Asn Ala Val Ile Tyr Glu Pro Gly Thr
180 185 190

sub US seq list.ST25

Ala Cys Val Lys Asp Ala Asp Cys Thr Thr Tyr Pro Gln Ser Thr Cys
195 200 205

Lys Asp Ser Leu Cys Ile Ile Pro Thr Pro His Pro Pro Asn Pro Pro
210 215 220

Asn Pro Pro Pro Ala Met Ser Pro Asn Ala Glu Met Thr Asp Ala Ala
225 230 235 240

Arg Lys Lys Val Leu Gly Met His Asn Trp Arg Arg Ser Gln Val Ala
245 250 255

Leu Gly Asn Val Gln Asn Gly Lys Asn Ala Tyr Asn Cys Pro Thr Ala
260 265 270

Thr Asp Met Tyr Lys Ile Glu Tyr Asp Cys Asp Leu Glu Asn Ser Ala
275 280 285

Leu Ala Tyr Ala Lys Gln Cys Ser Leu Val Gly Ser Ala Glu Gly Thr
290 295 300

Arg Pro Gly Glu Gly Glu Asn Val His Lys Gly Ala Leu Val Thr Asp
305 310 315 320

Pro Glu Ala Ala Val Gln Thr Ala Val Gln Ala Trp Trp Ser Gln Ile
325 330 335

Ser Gln Asn Gly Leu Asn Ala Gln Met Lys Phe Thr Ala Phe Leu Lys
340 345 350

Asp Lys Pro Asp Ala Pro Thr Ala Phe Thr Gln Met Ala Trp Ala Lys
355 360 365

sub US seq list.ST25

Ser Val Lys Leu Gly Cys Ala Val Ser Asn Cys Gln Ala Asp Thr Phe
370 375 380

Thr Val Cys Arg Tyr Lys Ala Ala Gly Asn Ile Val Gly Glu Phe Ile
385 390 395 400

Tyr Thr Lys Gly Asn Val Cys Asp Ala Cys Lys Ala Thr Cys Ile Thr
405 410 415

Ala Glu Gly Leu Cys Pro Thr Pro
420

<210> 27

<211> 1467

<212> DNA

<213> Ancylostoma caninum

<400> 27

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cgccactgat ttcaatgct ggaactcaa atcgacggat aactgcggg aacattacct 120

caaatccatt aacaacctaa ggaagaaaat cgccgatgga tcagcggaaa acaaatcagg 180

aaagtgcccg cagggaaga atatctacaa gctaagctgg gattgtgaat tggaactgaa 240

agcacagcaa getgtagacc agtgcaaacc gaatgtacc gaaccgcag gatattcgca 300

aatactaaag aaggtaaaa gcacctgcga cccaacgaag gtcctgaaga aacagataga 360

agcatggtgg actaagtccg tgaagatgc tggagttgat aatctccaa acaacaaca 420

aggtttgaa gatttcgcaa agttagcaaa tggaaaggct acgaagattg gttgtgcgca 480

gaaaaactgc aacgaacagt tgtacgtggc atgtgttatt aacgaaccgg ctctgcagt 540

gggtatgcca atctatgagg ttggagctgg atgtaattcc aaagacgatt gtacaacgta 600

tctgcagtcg aagtgcagta acaaagtatg cgtcgccggg caccaggtg atgccaccac 660

sub US seq list.ST25

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aactgcgcca gctccaccac caacaactgc agtcctaca acgacgagta cgattgggtc 780
gattgacaat acgatttgc cgcaaaacca agtgcacc gactcagtca ggctcacatt 840
cttgaatacg cacaacggac tcagatctca actcgcgcaa ggtcaaattc ttatgggaaa 900
tggcgctagg ggcgcgccg catcgaaaat gaggaggatg gtatataact gtgatgcgga 960
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caatgcacat ctggttgc ctatagtcag atgcggttg aacacgaac tcgtctgcc 1260
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ccccgactac cctgggactt ttgcaacca aggactctgc tcatttaag acccgccccg 1380
atatatctt ggggagataa tttacgagc aataaaccaa gcgtgaagaa aaaaaaaaaa 1440
aaaaaaaaa aaaaaaaaaa aaaaaa 1467

<210> 28

<211> 451

<212> PRT

<213> Ancylostoma caninum

<400> 28

Met Lys Leu Phe Ile Leu Val Leu Val Ala Ile Leu Gly Ile Ala His

1 5 10 15

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20 25 30

Glu His Tyr Leu Lys Ser Ile Asn Asn Leu Arg Lys Lys Ile Ala Asp

sub US seq list.ST25

35 40 45

Gly Ser Ala Glu Asn Lys Ser Gly Lys Cys Pro Gln Gly Lys Asn Ile
50 55 60

Tyr Lys Leu Ser Trp Asp Cys Glu Leu Glu Leu Lys Ala Gln Gln Ala
65 70 75 80

Val Asp Gln Cys Lys Pro Asn Val Pro Glu Pro Ala Gly Tyr Ser Gln
85 90 95

Ile Leu Lys Lys Val Lys Ser Thr Cys Asp Pro Thr Lys Val Leu Lys
100 105 110

Lys Gln Ile Glu Ala Trp Trp Thr Lys Ser Val Lys Asp Ala Gly Val
115 120 125

Asp Asn Pro Pro Asn Asn Lys Gln Gly Leu Glu Asp Phe Ala Lys Leu
130 135 140

Ala Asn Gly Lys Ala Thr Lys Ile Gly Cys Ala Gln Lys Asn Cys Asn
145 150 155 160

Glu Gln Leu Tyr Val Ala Cys Val Ile Asn Glu Pro Ala Pro Ala Val
165 170 175

Gly Met Pro Ile Tyr Glu Val Gly Ala Gly Cys Asn Ser Lys Asp Asp
180 185 190

Cys Thr Thr Tyr Leu Gln Ser Lys Cys Ser Asn Lys Val Cys Val Ala
195 200 205

Gly His Pro Gly Asp Ala Thr Thr Thr Thr Ser Thr Pro Ala Thr Thr
210 215 220

sub US seq list.ST25

Ala Pro Thr Thr Pro Thr Ile Pro Ala Gly Pro Thr Thr Ala Pro Ala
225 230 235 240

Pro Pro Pro Thr Thr Ala Ala Pro Thr Thr Thr Ser Thr Ile Gly Ser
 245 250 255

Ile Asp Asn Thr Ile Cys Pro Gln Asn Gln Val Ile Thr Asp Ser Val
 260 265 270

Arg Leu Thr Phe Leu Asn Thr His Asn Gly Leu Arg Ser Gln Leu Ala
 275 280 285

Gln Gly Gln Ile Phe Met Gly Asn Gly Ala Arg Ala Arg Pro Ala Ser
 290 295 300

Lys Met Arg Arg Met Val Tyr Asn Cys Asp Ala Glu Ser Ser Ala Arg
305 310 315 320

Asn Ser Ala Ala Gln Cys Leu Ser Ser Pro Gly Ser Pro Ser Gly Tyr
 325 330 335

Thr Glu Asn Leu His Val Ile Asn Asn Asn Phe Val Asp His Asn Ser
 340 345 350

Ala Ala Thr Gln Ala Phe Asn Ala Trp Trp Ser Glu Ile Asn Thr Gly
 355 360 365

Tyr Met Arg Gln Ala Glu Thr Glu Arg Asn Met Tyr Ser Leu Ser Val
 370 375 380

Gly Ile Pro Asn Phe Ala Lys Met Ala Trp Glu Thr Asn Ala His Leu
385 390 395 400

sub'US seq list.ST25

Gly Cys Ala Ile Val Arg Cys Gly Leu Asn Thr Asn Val Val Cys Pro
405 410 415

Tyr Ser Pro Lys Ser Asp Gly Gly Gln Ile Tyr Lys Met Gly Pro Phe
420 425 430

Cys Arg Arg Cys Pro Asp Tyr Pro Gly Thr Phe Cys Asn Gln Gly Leu
435 440 445

Cys Ser Phe
450

<210> 29
<211> 602
<212> DNA
<213> Ancylostoma caninum

<400> 29
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ccagctgcga acgtcagagt aaagttagtg gaggaagaca caggaccaga tccagatgac 180
ctactggatg caggatacac gaactccaac ggtgaattcc aactccaagg cggaacaata 240
gagacgactc ctattgacct cgtcttgaaa atttatcatg attgcaatga cgtgactggt 300
ttcctaagcg tacctaaacc tggcagcaga aaggtgaggt tctccttacc agacaagtac 360
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gaattgaaa aggaaggacg tgaatttacc gttgactaag tgatcaataa actcatcgct 480
ttctctttct atgtaaacad tttgttggtg aacaaatcat atggtgttac ataaccgaa 540
ctgttggttt ttcgaatact gcacaaataa agcatttctt ctaaaaaaaa aaaaaaaaaa 600
aa 602

sub US seq list.ST25

<210> 30

<211> 144

<212> PRT

<213> Ancylostoma caninum

<400> 30

Met Ile Gln Leu Phe Leu Leu Ala Leu Val Pro Met Cys Ile Ser Val
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Arg Glu Gln Ser Ile Ala Val Lys Gly Arg Leu Leu Cys Gly Asp Gln
20 25 30

Pro Ala Ala Asn Val Arg Val Lys Leu Trp Glu Glu Asp Thr Gly Pro
35 40 45

Asp Pro Asp Asp Leu Leu Asp Ala Gly Tyr Thr Asn Ser Asn Gly Glu
50 55 60

Phe Gln Leu Gln Gly Gly Thr Ile Glu Thr Thr Pro Ile Asp Pro Val
65 70 75 80

Leu Lys Ile Tyr His Asp Cys Asn Asp Val Thr Gly Phe Leu Ser Val
85 90 95

Pro Lys Pro Gly Ser Arg Lys Val Arg Phe Ser Leu Pro Asp Lys Tyr
100 105 110

Ile Ser Asp Gly Met Val Pro Lys Lys Val Met Asp Ile Gly Val Ile
115 120 125

Asn Leu Glu Val Glu Phe Glu Lys Glu Gly Arg Glu Phe Ile Val Asp
130 135 140

<210> 31

sub US seq list.ST25

<211> 838

<212> DNA

<213> Ancylostoma caninum

<400> 31

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tggccaatga tgctcagaag aagacgttat cacaggtgga caactacctc aacgaagtgc 300
aacagttcgg tgaacaggta agcaaagaag gctcggcgaa gtcgaggag aacaagggca 360
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ctatatgtga ttgtattct acttcgccgc attcagctct ggtattctga gacggattat 660
cgcttcgc acacactcac acacacaaat aacccccgat tatctccga ttatcacccg 720
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<210> 32

<211> 162

<212> PRT

<213> Ancylostoma caninum

<400> 32

Met Phe Cys Arg Val Thr Val Ala Val Leu Leu Leu Ala Val Ser Ala
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sub US seq list.ST25

Tyr Ala Gly Phe Phe Asp Asp Val Ser Gly Met Ala Ser Asp Val Gly
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Asn Phe Phe Thr Asn Gln Phe Asn Asn Val Lys Asp Leu Phe Ala Gly
 35 40 45

Asn Gln Ser Glu Leu Glu Lys Asn Ile Asn Arg Val Lys Asp Leu Leu
 50 55 60

Thr Ala Val Lys Glu Lys Ala Lys Met Leu Glu Pro Met Ala Asn Asp
 65 70 75 80

Ala Gln Lys Lys Thr Leu Ser Gln Val Asp Asn Tyr Leu Asn Glu Val
 85 90 95

Gln Gln Phe Gly Glu Gln Val Ser Lys Glu Gly Ser Ala Lys Phe Glu
 100 105 110

Glu Asn Lys Gly Lys Trp Gln Gln Met Leu Asn Asp Ile Phe Glu Lys
 115 120 125

Gly Gly Leu Asp Gly Val Leu Lys Leu Leu Asn Leu Lys Ser Ala Gly
 130 135 140

His Cys Thr Leu Val Ala Ala Ile Val Ala Pro Val Val Leu Ala Phe
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Thr Arg

<210> 33

<211> 2043

<212> DNA

<213> Ancylostoma caninum

sub US seq list.ST25

<400> 33

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aagcgaccaa ttcaccagct ccttggacct gatggcagcc cactgccgac agacgaatca 240
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acgaaacctg atggatcacc gcttcgacc gatgcttcag gaaactacgt caccgacgaa 480
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sub US seq list.ST25

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 cgagaactgg acctgcccc cgaacagta cgattctctg cgcttctcg atctaataca 1860
 gcttattaca agtctcctgg atctcgcca aacaactcca attcggcgac caaacgaagg 1920
 aacagcccag ccgtccctg atcggatgaac cccaggcttt taatgttgac aacgtttact 1980
 ttctggaact cctgtacat tttcaaaac acaataaaa ctttcaaaa aaaaaaaaaa 2040
 aaa 2043

<210> 34
 <211> 647
 <212> PRT
 <213> Ancylostoma caninum

<400> 34

Ser Pro Leu Pro Thr Asp Ala Ser Gly Asn Tyr Val Thr Asp Glu Gly
 1 5 10 15

Thr Val Ile Glu Lys Asp Asp Glu Gly Arg Pro Leu Gly Pro Asp Gly
 20 25 30

Gln Val Leu Pro Thr Asp Glu Ser Gly Asn Tyr Ile Tyr Pro Val Val
 35 40 45

sub US seq list.ST25

Gly Pro Asp Gly Ser Pro Leu Pro Thr Asp Glu His Lys Arg Pro Ile
50 55 60

His Pro Val Leu Gly Pro Asp Gly Ser Pro Leu Pro Thr Asp Glu Ser
65 70 75 80

Gly His Pro Leu Gly Glu Asp Gly Gln Pro Leu Pro Thr Asp Ala Ser
85 90 95

Gly Val Pro Val Asp Lys Asp Gly Gln Pro Leu Pro Thr Asp Ser Ser
100 105 110

Gly His Tyr Val Thr Val Pro Arg Glu Glu Ala Val Thr Lys Glu Leu
115 120 125

Pro Thr Asp Glu Ser Gly Asn Val Ile Tyr Pro Val Thr Lys Pro Asp
130 135 140

Gly Ser Pro Leu Pro Thr Asp Ala Ser Gly Asn Tyr Val Thr Asp Glu
145 150 155 160

Gly Thr Val Ile Glu Lys Asp Asp Glu Gly Arg Pro Leu Gly Pro Asp
165 170 175

Gly Gln Val Leu Pro Thr Asp Glu Ser Gly Asn Tyr Ile Tyr Pro Val
180 185 190

Val Gly Pro Asp Gly Ser Pro Leu Pro Thr Asp Glu Tyr Lys Arg Pro
195 200 205

Ile His Pro Val Leu Gly Pro Asp Gly Ser Pro Leu Pro Thr Asp Glu
210 215 220

sub US seq list.ST25

Ser Gly His Pro Leu Gly Glu Asp Gly Gln Pro Leu Pro Thr Asp Ala
225 230 235 240

Ser Gly Val Pro Val Asp Lys Asp Gly Gln Pro Leu Pro Thr Asp Ser
 245 250 255

Ser Gly His Tyr Val Thr Val Pro Arg Glu Glu Ala Val Thr Lys Glu
 260 265 270

Leu Pro Thr Asp Glu Ser Gly Asn Val Ile Tyr Pro Val Thr Lys Pro
 275 280 285

Asp Gly Ser Pro Leu Pro Thr Asp Ala Ser Gly Asn Phe Ile Thr Glu
 290 295 300

Glu Gly Leu Ile Ile Gly Pro Asp Gly Val Ala Leu Pro Tyr Pro Arg
305 310 315 320

Asn Arg Thr Cys Ser Leu Lys Gln Leu Lys Met Asp Ile Leu Phe Ala
 325 330 335

Val Ser Thr Thr Lys Val Ser Lys Ser Thr Phe Asp Ser Ile Leu Arg
 340 345 350

Ala Ile Ser Lys Phe Ala Asp Glu Val Asp Leu Ser Pro Asp Val Thr
 355 360 365

Arg Ile Gly Leu Val Tyr Gly Ser Lys Asp Val Val Val Pro Leu Pro
 370 375 380

Leu Gly Gly Tyr Gln Glu Lys Asp His Met Arg Asp Glu Ile Arg Arg
385 390 395 400

Ile Glu Phe Ser Asp Asp Gly Ser Gln Asp Tyr Ile Ser Leu Tyr Gly

sub US seq list.ST25

405 410 415

Pro Ala Lys Gln Gln Phe Val Met Phe Pro Arg Ala Asp Ser Ala Lys
420 425 430

Ile Ala Ile Phe Leu Ile Gln Asp Glu Ile Ser Tyr Cys Leu Ser Thr
435 440 445

Arg Thr Leu Arg Cys Gly Cys Ala Thr Ala Val Asp Ser Asp Phe Cys
450 455 460

Arg Arg Ile Asn Asn Val Leu Ala Asp Asp Ile Lys Val Cys Lys Val
465 470 475 480

Pro Glu Thr Ala Val Val Pro Thr Pro Val Val His Pro Gln Gly Ser
485 490 495

Arg Ala Val Ser Val Val Val Pro Arg Phe Phe Ser Ala Pro Pro Phe
500 505 510

Asp Thr His Ser Pro Ser Arg Leu Thr Leu Leu Ala Asp Phe Ala Thr
515 520 525

Glu Lys Glu Pro Leu Cys Gly Glu His Ser Phe Leu Ser Pro Gln Lys
530 535 540

Trp Gly Lys Asn His Cys Thr Leu Arg Ile Pro Leu Ser Met Pro Gly
545 550 555 560

Ile Asp His Lys Ser Asp Asp His Tyr Tyr Tyr Asp Asp Gln Thr Pro
565 570 575

Leu Glu Ser Glu Tyr Ser Leu Asp Leu Phe Gly Lys Ala Glu Leu Val
580 585 590

sub US seq list.ST25

Arg Phe Phe Val Gln Val Asn Val Glu Arg Glu Leu Asp Leu Ala Pro
595 600 605

Glu Thr Val Arg Phe Ser Ser Leu Leu Arg Ser Asn Ala Ala Tyr Tyr
610 615 620

Lys Ser Pro Gly Ser Arg Pro Asn Asn Ser Asn Ser Ala Thr Lys Arg
625 630 635 640

Arg Asn Ser Pro Ala Val Pro
645

<210> 35
<211> 1262
<212> DNA
<213> Ancylostoma caninum

<400> 35
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tgtccatgta cgcccgaata attgtggctc gacgtagtgg taggtatcga cacctctatt 180
ggtatgacag aggaaggagt gacacaggtc ctgccgatt tgtctacggt attcggagac 240
acaaaaatcg ctcaagggga agggcaccat tcccgattg gattcggtac atatgggctg 300
aatgccgaaa ctaggtacaa ctgactgat ttcaaatcaa cagacgatat gctggaggcg 360
atctgggata ttaagtgcag cgacgacaag tactccaatc tctttgctgg actgacgagg 420
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attattatct acgcgagcga ttccaggga ggcgacgtga atgacgcagt tcagctggca 540
catcagatca agatcggagg aacggatata atcgtagttg cttttgacca aaaaggaaaa 600
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sub US seq list.ST25

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ggaatcgag ccaactggtt agcagctaaa aaagcatgtc agagactcat ccctggaggt 840
catctcgcca ctgagctcga cagctacaag catgacttta ttgcacgaat gttcaaggat 900
gactatagac acgagcctcc atacatgtat cacatcggac ttctcttga caaacagaag 960
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aa 1262

<210> 36
<211> 382
<212> PRT
<213> Ancylostoma caninum

<400> 36

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Ala His Tyr Glu Arg Asp Cys Pro Cys Thr Pro Glu Lys Leu Trp Leu
20 25 30

Asp Val Val Val Gly Ile Asp Thr Ser Ile Gly Met Thr Glu Glu Gly
35 40 45

Val Thr Gln Val Leu Ala Asp Leu Ser Thr Val Phe Gly Asp Thr Lys
50 55 60

sub US seq list.ST25

Ile Ala Gln Gly Glu Gly His His Ser Arg Ile Gly Val Val Thr Tyr
65 70 75 80

Gly Leu Asn Ala Glu Thr Arg Tyr Asn Leu Thr Asp Phe Lys Ser Thr
 85 90 95

Asp Asp Met Leu Glu Ala Ile Trp Asp Ile Lys Cys Ser Asp Asp Lys
 100 105 110

Tyr Ser Asn Leu Phe Ala Gly Leu Thr Arg Thr Gln Glu Ile Met Lys
 115 120 125

Asn Gly Arg Gln Gly Arg Leu Arg Ala Asn Val Arg Ser Ala Ile Ile
 130 135 140

Ile Tyr Ala Ser Asp Phe Arg Glu Gly Asp Val Asn Asp Ala Val Gln
145 150 155 160

Leu Ala His Gln Ile Lys Ile Gly Gly Thr Asp Ile Ile Val Val Ala
 165 170 175

Phe Asp Gln Lys Gly Lys Val Asn Ala Leu Glu Gly Leu Gln Lys Ile
 180 185 190

Ala Ser Pro Gly Arg Leu Phe Lys Ser Thr Thr Lys Asn Leu Val Gly
 195 200 205

Leu Ile Gln Asp Ala Leu Cys Gln Thr Asn Cys Phe Cys Lys Lys Leu
 210 215 220

Trp Thr Gln Tyr Gly Asp Gly Ser Val Lys Tyr Gly Glu Cys Leu Arg
225 230 235 240

sub US seq list.ST25

Ile Gly Gly Ile Asp Ala Asn Trp Leu Ala Ala Lys Lys Ala Cys Gln
245 250 255

Arg Leu Ile Pro Gly Gly His Leu Ala Thr Glu Leu Asp Ser Tyr Lys
260 265 270

His Asp Phe Ile Ala Arg Met Phe Lys Asp Asp Tyr Arg His Glu Pro
275 280 285

Pro Tyr Met Tyr His Ile Gly Leu Ser Phe Asp Lys Gln Lys Asn Asp
290 295 300

Tyr Phe Trp Glu Gln Pro Lys Asp Arg Met Pro Leu Pro Leu Lys Asp
305 310 315 320

Ser Pro Phe Arg Tyr Trp Ser Arg Gly Phe Pro Asn Pro Arg Glu Lys
325 330 335

Asp Thr Cys Val Leu Ala Ala Gln Thr Thr Ile Leu Ser Pro Glu Ile
340 345 350

Gly Trp Gln Asn Glu His Cys Thr Lys Val Ala Lys Arg Tyr Ile Cys
355 360 365

Gln Val Glu Ser Cys Asp Thr Asp Asn Tyr Cys Ala Asn Leu
370 375 380

<210> 37

<211> 892

<212> DNA

<213> Ancylostoma caninum

<400> 37

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sub US seq list.ST25

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 acgtgagatt acaccatcgg agcagcaaga gttgggtcaaa taccaaaacg acgtagctga 240
 gtacaagacg gctctgaaac aagcaatcaa ggagcgtgag gagaaaatcc gagcccgtct 300
 cgccggttaag aaggtgaagg ccgtggagtc aaccaaccaa gaggacctac cgaaaccgcc 360
 acagaagccg tcattctgca caccagaaga cactacccaa ttcttcttcg aaggatgcat 420
 gatccagaac aacaagatct acgtcggaaa cactttcgct cgagacctga ctcagcctga 480
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 cgctcccag cagccgcca cgccgaactt ctgcaccaga ataatctaag cctctaaatt 720
 gttcgtttcg ctattggatt ggttggttg gtgaatagcg attccgcttc ccctctcgta 780
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 atattgtaca ttatataat aaaattatta tcttaaaaaa aaaaaaaaaa aa 892

<210> 38

<211> 228

<212> PRT

<213> Ancylostoma caninum

<400> 38

Met Lys Leu Leu Ala Leu Ser Ala Leu Phe Ala Leu Ala Phe Ala Ala
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Pro Arg Asp Lys Arg Leu Ala Val Ser Thr Ile Thr Val Thr Gly Gly
 20 25 30

Leu Gly Leu Ser Thr Gly Cys Val Val Thr Gly Asn Val Leu Tyr Ala

sub US seq list.ST25

35 40 45

Asn Gly Phe Arg Val Arg Glu Ile Thr Pro Ser Glu Gln Gln Glu Leu
50 55 60

Val Lys Tyr Gln Asn Asp Val Ala Glu Tyr Lys Thr Ala Leu Lys Gln
65 70 75 80

Ala Ile Lys Glu Arg Glu Glu Lys Ile Arg Ala Arg Leu Ala Gly Lys
85 90 95

Lys Val Lys Ala Val Glu Ser Thr Asn Gln Glu Asp Leu Pro Lys Pro
100 105 110

Pro Gln Lys Pro Ser Phe Cys Thr Pro Glu Asp Thr Thr Gln Phe Phe
115 120 125

Phe Glu Gly Cys Met Ile Gln Asn Asn Lys Ile Tyr Val Gly Asn Thr
130 135 140

Phe Ala Arg Asp Leu Thr Gln Pro Glu Ile Ser Glu Leu Lys Glu Phe
145 150 155 160

Glu Lys Lys Phe Lys Val Tyr Gln Asp Tyr Val Gln Lys Gln Ala Glu
165 170 175

Gln Gln Val Asn Ser Leu Phe Gly Gly Ser Asp Phe Phe Ser Ala Leu
180 185 190

Phe Ser Gly Gly Glu Thr Ser Lys Pro Ser Thr Thr Thr Val Ala Pro
195 200 205

Glu Leu Pro Glu Asp Ala Pro Glu Gln Pro Pro Thr Pro Asn Phe Cys
210 215 220

sub US seq list.ST25

Thr Arg Ile Ile
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<210> 39

<211> 1722

<212> DNA

<213> Ancylostoma caninum

<400> 39

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aagattaaag ctgtgcttaa cggcactgca ctcatcgca ttcgtgaaaa attcattcga 180

ctaaggga aaataaaagc aaagctgacg ctctctccag cacgaaaggc tatattggac 240

gaagttatga agcatatcaa aatgatcaaa aaggataaga ttcaagagaa gggcgactca 300

atcgatgaaa tcaatgaaaa gagtgaatc ggacagttgc tgtaccaggg tgacatcgtt 360

ctgacagaaa agcaagccca gcaaattacc gaagacattg aaaatgacaa aggcgaccgc 420

gaaaaacgac aggcgttccg tgatcgcaat tatccgcgaa cattatggc gaaggagtg 480

tactttcact tcataggaa cgcaactcct gaagttagaa gcgttttgt gaaaggcgca 540

aaactttgga tgaaggatac ttgcatgac ttctcgaaa gcaactcagc gcctgatagg 600

attcgtgtgt tcaagagaa cggatgttg tcgtacgttg gtaggctggg cggatgaaca 660

gatctgtcac tgggagaagg ttgtcaatcg gtggcacag ctgcgcacga aattggccac 720

gctattggct tctaccacac tcacgcaaga catgatcgcg ataactttat tacattcaac 780

gcacaaaatg tcaagcccg ttggttgac caattcactc ttgactcc ggcaacgaat 840

gagaactatg gaataactta cgactatgga agtatcatgc attatggtgc aaatagcgcc 900

tcgcagaacg gacgtcctac aatggttccg catgatccca aatagtaga aactcttgga 960

tcaccataa ttctcttcta tgagctctc atgatcaaca aacactacga ctgcactaag 1020

sub US seq list.ST25

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 ggatcgggat ctatatacca ggccaccaat cagtaccaga ccttgcacga cgaaattgga 1200
 gacaagagag cgggacagag acctagagaa gacatggact tctgctatta ttgatcacg 1260
 gccccaaaag gttcaaaaat cgaaatcaaa attgctggat taccacaagg agccgctgtt 1320
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 tccgtcaaaa gaggtctatg tccaaagtcc agcgggttct gtcgctaact ttcagcaaa 1680
 caatggaata aatgttcac cataaaaaaa aaaaaaaaaa aa 1722

<210> 40

<211> 536

<212> PRT

<213> Ancylostoma caninum

<400> 40

Met Arg Val Leu Leu Leu Leu Leu Leu Ser Ile Cys Ala Ser Ala
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Gly Phe Leu Asp Thr Lys Phe Gly Gln Lys Ile Lys Lys Thr Leu Asp
 20 25 30

Lys Ile Lys Ala Val Leu Asn Gly Thr Ala Leu Ile Ala Ile Arg Glu
 35 40 45

sub US seq list.ST25

Lys Phe Ile Arg Leu Arg Glu Lys Ile Lys Ala Lys Leu Thr Leu Ser
50 55 60

Pro Ala Arg Lys Ala Ile Leu Asp Glu Val Met Lys His Ile Lys Met
65 70 75 80

Ile Lys Lys Asp Lys Ile Gln Glu Lys Gly Asp Ser Ile Asp Glu Ile
85 90 95

Asn Glu Lys Ser Ala Ile Gly Gln Leu Leu Tyr Gln Gly Asp Ile Val
100 105 110

Leu Thr Glu Lys Gln Ala Gln Gln Ile Thr Glu Asp Ile Glu Asn Asp
115 120 125

Lys Gly Asp Arg Glu Lys Arg Gln Ala Phe Arg Asp Arg Asn Tyr Pro
130 135 140

Arg Thr Leu Trp Ser Lys Gly Val Tyr Phe His Phe His Arg Asn Ala
145 150 155 160

Thr Pro Glu Val Arg Ser Val Phe Val Lys Gly Ala Lys Leu Trp Met
165 170 175

Lys Asp Thr Cys Ile Asp Phe Phe Glu Ser Asn Ser Ala Pro Asp Arg
180 185 190

Ile Arg Val Phe Lys Glu Asn Gly Cys Trp Ser Tyr Val Gly Arg Leu
195 200 205

Gly Gly Glu Gln Asp Leu Ser Leu Gly Glu Gly Cys Gln Ser Val Gly
210 215 220

Thr Ala Ala His Glu Ile Gly His Ala Ile Gly Phe Tyr His Thr His

sub US seq list.ST25

225	230	235	240
Ala Arg His Asp Arg Asp Asn Phe Ile Thr Phe Asn Ala Gln Asn Val			
	245	250	255
Lys Pro Asp Trp Leu Asp Gln Phe Thr Leu Gln Thr Pro Ala Thr Asn			
	260	265	270
Glu Asn Tyr Gly Ile Thr Tyr Asp Tyr Gly Ser Ile Met His Tyr Gly			
	275	280	285
Ala Asn Ser Ala Ser Gln Asn Gly Arg Pro Thr Met Val Pro His Asp			
	290	295	300
Pro Lys Tyr Val Glu Thr Leu Gly Ile Asn Lys His Tyr Asp Cys Thr			
305	310	315	320
Lys Asn Cys Asp Pro Ala Thr Ser Ala Gln Cys Lys Met Gly Gly Phe			
	325	330	335
Pro His Pro Arg Asp Cys Thr Arg Cys Ile Cys Pro Ser Gly Tyr Gly			
	340	345	350
Gly Lys Leu Cys Asp Gln Lys Pro Ala Gly Cys Gly Ser Ile Tyr Gln			
	355	360	365
Ala Thr Asn Gln Tyr Gln Thr Leu His Asp Glu Ile Gly Asp Lys Arg			
	370	375	380
Ala Gly Gln Arg Pro Arg Glu Asp Met Asp Phe Cys Tyr Tyr Trp Ile			
385	390	395	400
Thr Ala Pro Lys Gly Ser Lys Ile Glu Ile Lys Ile Ala Gly Leu Ser			
	405	410	415

sub US seq list.ST25

Gln Gly Ala Ala Val Glu Gly Cys Gln Tyr Trp Gly Val Glu Ile Lys
420 425 430

Thr His Ala Asp Gln Arg Leu Thr Gly Tyr Arg Phe Cys Ala Pro Glu
435 440 445

Asp Val Gly Val Arg Leu Val Ser Asn Phe Asn Ile Val Pro Ile Ile
450 455 460

Thr Tyr Asn Ile Phe Tyr Ala Thr Tyr Val Asp Ile Gln Tyr Arg Ile
465 470 475 480

Val Gly Asp Asn Val Gly Gly Pro Met Pro Gln Pro Gln Pro Asn Ser
485 490 495

Asn Cys Val Asp Asn Glu Gln Cys Ala Thr Leu Val Arg Thr Lys Asn
500 505 510

Phe Cys Gln Ser Arg Phe Phe Thr Ser Ser Val Lys Arg Gly Leu Cys
515 520 525

Pro Lys Ser Ser Gly Phe Cys Arg
530 535

<210> 41

<211> 850

<212> DNA

<213> Ancylostoma caninum

<400> 41

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tgacaatggc aaatatgtga ttccgtacgt cattaacgga agttatggag aggagaaaaa 180

sub US seq list.ST25

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 cattcgacca gagaggaaag atcatatcaa gatacactgg gagaacatcg agaaaggta 480
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 ctactccatc atgcactaca agaaggacgc ctttgccaag ccgggcacga tcacaatgga 600
 aactttggat aagcgtacc aggatatcat tgggaatcaa gagaagccgt cgaagtggga 660
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 ttaaagaaag gaatgacgtt aacataagga atggttgccg atttcaaca aacgaacgtc 780
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 aaaaaaaaaa 850

<210> 42
 <211> 233
 <212> PRT
 <213> Ancylostoma caninum

<400> 42

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Asp Glu Glu Asp Asp Leu Pro Arg Asn Pro Leu Trp Asp Ala Tyr Lys
 20 25 30

Asp Asp Asn Gly Lys Tyr Val Ile Pro Tyr Val Ile Asn Gly Ser Tyr
 35 40 45

sub US seq list.ST25

Gly Glu Glu Lys Lys Val Leu Phe Glu Met Met Asp Glu Ile Asp Lys
50 55 60

Asn Thr Cys Val Arg Phe Ile Pro Arg Ser Thr Glu Gln Asp Tyr Ile
65 70 75 80

Glu Ile Val Asn Arg Leu Gly Glu Gly Thr Gly Ala Val Val Gly Lys
85 90 95

Pro Gly Gly Lys Ser Ile Val Leu Leu Glu Ser Ser Lys Ile Leu Asn
100 105 110

Asp Pro Thr Pro Ala Pro Val Met Gln Thr Leu Met Lys Ile Ile Gly
115 120 125

Leu Pro Pro Glu His Ile Arg Pro Glu Arg Lys Asp His Ile Lys Ile
130 135 140

His Trp Glu Asn Ile Glu Lys Gly Tyr Glu Ala Phe Phe Ala Leu Ser
145 150 155 160

Ser Val Lys Pro Asp Pro Tyr Gly Ile Pro Tyr Asp Tyr Tyr Ser Ile
165 170 175

Met His Tyr Lys Lys Asp Ala Phe Ala Lys Pro Gly Thr Ile Thr Met
180 185 190

Glu Thr Leu Asp Lys Arg Tyr Gln Asp Ile Ile Gly Asn Gln Glu Lys
195 200 205

Pro Ser Lys Leu Asp Tyr Lys Lys Ile Cys Thr Lys Tyr Lys Cys Asp
210 215 220

Ile Cys Met Gly Glu Lys Met Lys Tyr

sub US seq list.ST25

225

230

<210> 43

<211> 1168

<212> DNA

<213> Ancylostoma caninum

<400> 43

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gaacgtcgag tctgaagtgg aacaagaggg attcagacgg gaattttgtc ataccgtaca 240

taattacagg acgctatgac cgaacggagc ggggaatatc aaggaagcaa tgaggcgcat 300

cgaggcaaat acgtgtattc gtttcaagca aagagactat gagagagact atatcgagat 360

ccagaacaaa gctggacatg gatgttacac caatgtcggg cgtgtcgggt gcagaagtat 420

actgatgctc gattccagct tcgaggaaac atgcatggag acagaaatcg tgctgcacga 480

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caaagtgcac tacgagaaca tcgaaaggag ttactggaac caattcgaga aagtctcacc 600

gatggaagct accacgtata acgtaccgta tgactacaaa tccgtcatgc actacgagaa 660

gtcggcattc gccagacctg gacgaatcag catggaaacg cttgatccca aatatcagaa 720

cgatcatgga caccagaagg acgcctctcc cagtgtactac cgtaagatct gcgagatata 780

ccagtgtaa aagtgcata acggcaagat cgagatcgga ggcgactcgg actccaaccc 840

gaaaccgcca accgaggccc cagtcacat cagaccggcg ccagaaatca acggagaatg 900

ccgcgatatg atcccgctt tctgccgagc gttggcccgc tcgcacatga tcgactgcag 960

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sub US seq list.ST25

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atttgcaaaa taaaaaaaaa aaaaaaaaa 1168

<210> 44

<211> 366

<212> PRT

<213> Ancylostoma caninum

<400> 44

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20 25 30

Lys Glu Gly Gly Asp Ile Thr Gln Leu Arg Glu Lys Gly Ser Ala Met
35 40 45

Phe Asn Ala Leu His Arg Thr Ser Ser Leu Lys Trp Asn Lys Arg Asp
50 55 60

Ser Asp Gly Asn Phe Val Ile Pro Tyr Ile Ile Thr Gly Arg Tyr Asp
65 70 75 80

Arg Thr Glu Arg Gly Thr Ile Lys Glu Ala Asn Arg Arg Ile Glu Ala
85 90 95

Asn Thr Cys Ile Arg Phe Lys Gln Arg Asp Tyr Glu Arg Asp Tyr Ile
100 105 110

Glu Ile Gln Asn Lys Ala Gly His Gly Cys Tyr Thr Asn Val Gly Arg
115 120 125

Val Gly Gly Arg Ser Ile Leu Met Leu Glu Ser Ser Phe Glu Glu Thr

sub US seq list.ST25

130 135 140

Cys Met Glu Thr Glu Ile Val Leu His Glu Leu Met His Val Val Gly
145 150 155 160

Leu Trp His Glu His Met Arg His Asp Arg Asp Lys Tyr Ile Lys Val
165 170 175

His Tyr Glu Asn Ile Glu Arg Ser Tyr Trp Asn Gln Phe Glu Lys Val
180 185 190

Ser Pro Met Glu Ala Thr Thr Tyr Asn Val Pro Tyr Asp Tyr Lys Ser
195 200 205

Val Met His Tyr Glu Lys Ser Ala Phe Ala Arg Pro Gly Arg Ile Ser
210 215 220

Met Glu Thr Leu Asp Pro Lys Tyr Gln Asn Val Ile Gly His Gln Lys
225 230 235 240

Asp Ala Ser Pro Ser Asp Tyr Arg Lys Ile Cys Glu Ile Tyr Gln Cys
245 250 255

Lys Lys Cys Met Asn Gly Lys Ile Glu Ile Gly Gly Asp Ser Asp Ser
260 265 270

Asn Pro Lys Pro Pro Thr Glu Ala Pro Val Thr Ile Arg Pro Ala Pro
275 280 285

Glu Ile Asn Gly Glu Cys Arg Asp Met Ile Pro Ser Phe Cys Arg Ala
290 295 300

Leu Ala Arg Ser His Met Ile Asp Cys Ser Phe Phe His Lys Gln Gln
305 310 315 320

sub US seq list.ST25

Cys Cys Ala Thr Cys Ala Glu Leu Gly His Arg Asp Gln Asp Gln Gly
 325 330 335

Gly Trp Leu Glu Gln Thr Gly Trp Pro Phe Asp Gly Leu Phe Arg Ile
 340 345 350

Phe Gly Gln Gly Gly Trp Pro Phe Thr Phe Phe Asn Arg Trp
 355 360 365

<210> 45

<211> 621

<212> DNA

<213> Ancylostoma caninum

<400> 45

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ccaaggaggt agccgaccac atcaaggcta tcaactgagga ggagaagacc atcttgaagg 180

aggtgctgaa ggactacgcc aaatacaagg acgagaatga gtatttggca gcgctgaagg 240

aaaagtcacc cagcctgcac gagaaggcaa agaagttcca cgacttcatt aaggctaagg 300

tcgacgcact tggggatgaa gcaaaggcgt tcgtgaagaa agtgattgct gctgctcgca 360

aactgcacgc agagtcctt gccgggaaca aaccttctct tgaggaactg aagaacactg 420

tcaagaaata cgtggccgaa ttcgacgcgc tgaccgcagc cgcaaaagaa gatctcaaga 480

agcacttccc catcctcact tccattttca ccaacgagaa ggcaaaggcg ttgatggaca 540

agcacttgcc gaactaggtg aagcagcagt tgttttagt cgaataaatg ttcaacttt 600

ttaaaaaaaa a 621

<210> 46

<211> 181

sub US seq list.ST25

<212> PRT

<213> Ancylostoma caninum

<400> 46

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20 25 30

Arg Glu Leu Ile Pro Lys Glu Val Ala Asp His Ile Lys Ala Ile Thr
35 40 45

Glu Glu Glu Lys Thr Ile Leu Lys Glu Val Leu Lys Asp Tyr Ala Lys
50 55 60

Tyr Lys Asp Glu Asn Glu Tyr Leu Ala Ala Leu Lys Glu Lys Ser Pro
65 70 75 80

Ser Leu His Glu Lys Ala Lys Lys Phe His Asp Phe Ile Lys Ala Lys
85 90 95

Val Asp Ala Leu Gly Asp Glu Ala Lys Ala Phe Val Lys Lys Val Ile
100 105 110

Ala Ala Ala Arg Lys Leu His Ala Glu Leu Leu Ala Gly Asn Lys Pro
115 120 125

Ser Leu Glu Glu Leu Lys Asn Thr Val Lys Lys Tyr Val Ala Glu Phe
130 135 140

Asp Ala Leu Thr Ala Ala Ala Lys Glu Asp Leu Lys Lys His Phe Pro
145 150 155 160

sub US seq list.ST25

Ile Leu Thr Ser Ile Phe Thr Asn Glu Lys Ala Lys Ala Leu Met Asp
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Lys His Leu Pro Asn
 180

<210> 47

<211> 2384

<212> DNA

<213> Ancylostoma caninum

<400> 47

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sub US seq list.ST25

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sub US seq list.ST25

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gtctatgaaa caataaagta ttaattttgt taaaaaaaaa aaaa 2384

<210> 48

<211> 759

<212> PRT

<213> Ancylostoma caninum

<400> 48

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20 25 30

Ala Phe Arg Lys Phe Gly Tyr Asp Arg Cys Thr Asn Lys Cys Ile Pro
35 40 45

Tyr Thr Tyr Gly Gly Cys Gly Gly Ser Ser Asn Met Phe Asp Thr Leu
50 55 60

Glu Glu Cys Gln Glu Lys Cys Gly Lys Pro Glu Asp Arg Cys Ser Lys
65 70 75 80

Pro Leu Glu Arg Gly Ile Cys Leu Ala Ser Met Lys Arg Tyr Gly Tyr
85 90 95

Asp Thr Ser Ser Lys Lys Cys Lys Ala Phe Ile Tyr Gly Gly Cys Gly
100 105 110

Gly Asn Glu Asn Asn Phe Glu Thr Met Ala Glu Cys Arg Glu Thr Cys
115 120 125

Lys Asp Thr Ser Ser Glu Glu Glu Ser Val Pro Asp Ala Cys Leu Leu

sub US seq list.ST25

130 135 140

Pro Ser Glu Val Gly Pro Cys Lys Gly Lys Glu Arg Arg Phe Tyr Phe
145 150 155 160

Asp Gln Lys Arg Gly Asn Cys Lys Ser Phe Phe Phe Gly Gly Cys Gly
 165 170 175

Gly Asn Gly Asn Asn Phe Met Thr Lys Ala Lys Cys Met Glu Thr Cys
 180 185 190

Ser Lys His Ile Lys Pro Glu Thr Glu Gln Asp Val Cys Ser Gln Pro
 195 200 205

Ile Lys Ala Gly Pro Cys Met Ala Met Leu Lys Arg Tyr Ala Tyr Asp
 210 215 220

Asn Lys Lys Lys Arg Cys Val Gln Phe Ile Tyr Gly Gly Cys Lys Gly
225 230 235 240

Asn Lys Asn Asn Phe Glu Ser Met Glu Glu Cys Thr Arg Thr Cys Lys
 245 250 255

Lys Ala Val Pro Glu Pro Glu Gln Asp Thr Cys Ser Gln Pro Ile Glu
 260 265 270

Val Gly Pro Cys Lys Ala Met Leu Lys Arg Tyr Ala Tyr Asp Asn Lys
 275 280 285

Lys Asn Lys Cys Val Arg Phe Ile Tyr Gly Gly Cys Lys Gly Asn Lys
 290 295 300

Asn Asn Phe Glu Ser Met Glu Glu Cys Thr Arg Thr Cys Lys Lys Ala
305 310 315 320

sub US seq list.ST25

Val Pro Glu Pro Glu Gln Asp Thr Cys Ser Gln Pro Ile Glu Val Gly
325 330 335

Pro Cys Lys Ala Met Leu Lys Arg Tyr Ala Tyr Asp Asn Lys Lys Asn
340 345 350

Lys Cys Val Arg Phe Ile Tyr Gly Gly Cys Lys Gly Asn Lys Asn Asn
355 360 365

Phe Glu Ser Met Glu Glu Cys Thr Arg Thr Cys Lys Lys Ala Val Pro
370 375 380

Glu Pro Glu Pro Glu Lys Glu Thr Cys Ser Gln Pro Ile Glu Val Gly
385 390 395 400

Pro Cys Lys Ala Met Leu Lys Arg Tyr Ala Tyr Asp Asn Lys Lys Asn
405 410 415

Lys Cys Val Arg Phe Ile Tyr Gly Gly Cys Lys Gly Asn Lys Asn Asn
420 425 430

Phe Glu Ser Met Glu Glu Cys Thr Arg Thr Cys Lys Lys Ala Val Pro
435 440 445

Glu Pro Glu Gln Asp Thr Cys Ser Gln Pro Ile Glu Val Gly Pro Cys
450 455 460

Lys Ala Met Leu Lys Arg Tyr Ala Tyr Asp Asn Lys Lys Asn Lys Cys
465 470 475 480

Val Arg Phe Ile Tyr Gly Gly Cys Lys Gly Asn Lys Asn Asn Phe Glu
485 490 495

sub US seq list.ST25

Ser Met Glu Glu Cys Thr Arg Thr Cys Lys Lys Ala Val Pro Glu Pro
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515 520 525

Lys Ala Met Val Arg Arg Phe Ala Tyr Asp Asn Ala Lys Glu Lys Cys
530 535 540

Val Glu Phe Phe Tyr Gly Gly Cys Lys Gly Asn Lys Asn Asn Phe Glu
545 550 555 560

Thr Met Glu Asp Cys Thr Phe Thr Cys Glu Gln Arg Leu Ala Lys Pro
565 570 575

Glu Leu Glu Lys Asp Val Cys Ser Gln Pro Ile Thr Ala Gly Pro Cys
580 585 590

Arg Ala Ser Ile Pro Arg Tyr Gly Tyr Asp Ser Lys Lys Arg Lys Cys
595 600 605

Val Lys Phe Thr Tyr Gly Gly Cys Lys Gly Asn Gly Asn Arg Phe Pro
610 615 620

Thr Lys Asn Glu Cys Glu Lys Thr Cys Lys Arg Gly Ala Thr Gly Thr
625 630 635 640

Thr Asn Pro Gly Gly Glu Asn Asp Lys Cys Leu Leu Pro Ile Val Thr
645 650 655

Gly Pro Cys Lys Gly Lys Asn Arg Arg Tyr Ala Tyr Asn Asn Lys Thr
660 665 670

sub US seq list.ST25

Gly Lys Cys Val Arg Phe Thr Tyr Gly Gly Cys Gly Gly Asn Glu Asn
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Asn Phe Lys Thr Lys Lys Asp Cys Gln Asp Ala Cys Glu Asn Ile Asn
690 695 700

Ala Ala Ser Pro Cys Thr Leu Pro Ile Asp Lys Gly Glu Gly Asp Leu
705 710 715 720

Asn Leu Thr Arg Tyr Gly Phe Lys Asn Gly Lys Cys Val Ala Phe Lys
725 730 735

Tyr Gly Gly Arg Arg Gly Asn Leu Asn Asn Phe Gly Ser Lys Ala Asp
740 745 750

Cys Lys Glu Ala Cys Leu Lys
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<210> 49
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<212> DNA
<213> Ancylostoma caninum

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ttccacgaca tcgcgtgcat gcttcgtcac cggtatgact ccggagcadc gtcgacgtac 420
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sub US seq list.ST25

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<210> 50

<211> 442

<212> PRT

<213> Ancylostoma caninum

<400> 50

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sub US seq list.ST25

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35 40 45

Lys Gln Arg Tyr His Tyr Gln Lys Lys Leu Leu Ala Lys Tyr Ala Ala
50 55 60

Ile Lys Ala Thr Lys Leu Gln Ser Thr Asn Glu Ile Asp Glu Leu Leu
65 70 75 80

Arg Asn Tyr Met Asp Ala Gln Tyr Phe Gly Thr Ile Gln Ile Gly Thr
85 90 95

Pro Ala Gln Asn Phe Thr Val Ile Phe Asp Thr Gly Ser Ser Asn Leu
100 105 110

Trp Val Pro Ser Glu Lys Met Pro Phe His Asp Ile Ala Cys Met Leu
115 120 125

Arg His Arg Tyr Asp Ser Gly Ala Ser Ser Thr Tyr Lys Glu Asp Gly
130 135 140

Arg Lys Met Ala Ile Gln Tyr Gly Thr Gly Ser Met Lys Gly Phe Ile
145 150 155 160

Ser Lys Asp Asn Val Cys Ile Ala Gly Ile Cys Ala Glu Glu Gln Pro
165 170 175

Phe Ala Glu Ala Thr Ser Glu Pro Gly Leu Thr Phe Ile Ala Ala Lys
180 185 190

Phe Asp Gly Ile Leu Gly Ile Thr Phe Pro Glu Ile Ser Val Leu Gly

sub US seq list.ST25

195 200 205

Val Pro Pro Val Phe His Thr Phe Ile Glu Gln Lys Lys Val Pro Ser
210 215 220

Pro Val Phe Ala Leu Trp Leu Asn Arg Asn Pro Asp Ser Glu Leu Gly
225 230 235 240

Gly Glu Ile Thr Leu Gly Gly Asn Asp Thr Arg Arg Tyr Val Glu Pro
245 250 255

Ile Thr Trp Thr Pro Val Thr Arg Arg Gly Tyr Trp Gln Phe Lys Met
260 265 270

Asp Lys Val Gln Gly Gly Ser Thr Ser Ile Ala Cys Pro Asn Glu Phe
275 280 285

Ser Gly Cys Gln Ala Ile Ala Asp Thr Gly Thr Ser Leu Ile Ala Gly
290 295 300

Pro Lys Ala Gln Ser Arg Ala Ser Arg Asn Ser Leu Val Leu Glu Pro
305 310 315 320

Thr Tyr Glu Gly Glu Tyr Met Ile Pro Cys Asp Lys Val Pro Phe Pro
325 330 335

Pro Arg Leu Ser Phe Val Ile Glu Ala Arg Thr Phe Thr Leu Lys Gly
340 345 350

Glu Asp Tyr Val Leu Thr Val Lys Ala Gly Gly Lys Ser Ile Cys Leu
355 360 365

Ser Gly Phe Met Gly Met Asp Phe Pro Glu Arg Ile Gly Glu Leu Trp
370 375 380

sub US seq list.ST25

Ile Leu Gly Asp Val Phe Ile Gly Lys Tyr Tyr Thr Val Phe Asp Val
385 390 395 400

Gly Gln Ala Arg Leu Gly Phe Ala Gln Ala Lys Ser Glu Asp Gly Tyr
 405 410 415

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 420 425 430

Gly Ser Asp Glu Asp Asp Val Phe Thr Leu
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<210> 51
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<212> DNA
<213> Ancylostoma caninum

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<223> n is a, c, g, or t

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<223> n is a, c, g, or t

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gcgtctatca cgctcacaat tggccagcgc cagtacaaaa ttgaatcaaa gaacctcatc 180

attcatgtcg aagcagatac atgcatcttg gcactacatg gataccactt tctcggagca 240

acatggatct ttggtgcacc gttcataagg cagttctgta atatttatga tatgggtaac 300

aaaaggatag gattcgctca ttcgtgcag aattagcctg catttactag tntttattcg 360

acattnttaa acaactccct caataaagta ttgngtttca aaaaaaaaaa aaaaaaaaaa 420

a 421

<210> 52

<211> 111

<212> PRT

<213> Ancylostoma caninum

<400> 52

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Glu Ile Ala Ser Asn Leu Thr Ala Thr Tyr Asn Lys Glu His Asp Leu

20 25 30

Tyr Tyr Ile Asp Cys Arg Ala Asn Ala Ser Ile Thr Leu Thr Ile Gly

35 40 45

Gln Arg Gln Tyr Lys Ile Glu Ser Lys Asn Leu Ile Ile His Val Glu

50 55 60

sub US seq list.ST25

Ala Asp Thr Cys Ile Leu Ala Leu His Gly Tyr His Phe Leu Gly Ala
65 70 75 80

Thr Trp Ile Phe Gly Ala Pro Phe Ile Arg Gln Phe Cys Asn Ile Tyr
 85 90 95

Asp Met Gly Asn Lys Arg Ile Gly Phe Ala His Ser Leu Gln Asn
 100 105 110

<210> 53

<211> 371

<212> DNA

<213> Ancylostoma caninum

<400> 53

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<210> 54

<211> 77

<212> PRT

<213> Ancylostoma caninum

<400> 54

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Thr Gln Lys Pro Cys Glu Ala Lys Cys Asn Glu Glu Pro Pro Glu Glu

sub US seq list.ST25

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Glu Asp Pro Ile Cys Arg Ser Arg Gly Cys Leu Leu Pro Pro Ala Cys
35 40 45

Val Cys Lys Asp Gly Phe Tyr Arg Asp Thr Val Ile Gly Asp Cys Val
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Arg Glu Glu Glu Cys Asp Gln His Glu Ile Ile His Val
65 70 75

<210> 55

<211> 1321

<212> DNA

<213> Ancylostoma ceylanicum

<400> 55

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cctcgacttc cacaacaatg ctccggagacg agttgcgcaa ggagttgagg ataacaaatc 180

cggcaaatg aatccagcga agaacatgta taagctggac tgggactgtg agatggaaca 240

gaagctccag gatgctatcc aatcctgccc aggcggcctt gctggaattc aaggtgttgc 300

gcagaatata ataagctggt caggctccgg tggattcccg aatccatcag aaaagataaa 360

ctcaacactt gccagctggt ggggtggtgc aaaaaacaac ggcgtcgcct cagacaacaa 420

atacactggt ggaggtcttt acgccttttc caatatggtc ttctctgaga cgacaaaact 480

cggttgcgcc tacaagggtt gcggcactaa actgacgcta tcgtgcattt ataacggaat 540

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ctgcaccaca ttcaagaact caggttgcca agacggcctc tgacgaaag gagcagatgt 660

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sub US seq list.ST25

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<210> 56
 <211> 422
 <212> PRT
 <213> Ancylostoma ceylanicum

<400> 56

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 35 40 45

Arg Arg Val Ala Gln Gly Val Glu Asp Asn Lys Ser Gly Lys Leu Asn
 50 55 60

sub US seq list.ST25

Pro Ala Lys Asn Met Tyr Lys Leu Asp Trp Asp Cys Glu Met Glu Gln
65 70 75 80

Lys Leu Gln Asp Ala Ile Gln Ser Cys Pro Gly Gly Phe Ala Gly Ile
 85 90 95

Gln Gly Val Ala Gln Asn Ile Ile Ser Trp Ser Gly Ser Gly Gly Phe
 100 105 110

Pro Asn Pro Ser Glu Lys Ile Asn Ser Thr Leu Ala Ser Trp Trp Gly
 115 120 125

Gly Ala Lys Asn Asn Gly Val Ala Ser Asp Asn Lys Tyr Thr Gly Gly
 130 135 140

Gly Leu Tyr Ala Phe Ser Asn Met Val Phe Ser Glu Thr Thr Lys Leu
145 150 155 160

Gly Cys Ala Tyr Lys Val Cys Gly Thr Lys Leu Thr Leu Ser Cys Tyr
 165 170 175

Asn Gly Ile Gly Tyr Met Thr Gly Ala Pro Met Trp Glu Thr Gly Gln
 180 185 190

Ala Cys Lys Ala Gly Ala Asp Cys Thr Thr Phe Lys Asn Ser Gly Cys
 195 200 205

Glu Asp Gly Leu Cys Thr Lys Gly Ala Asp Val Pro Glu Thr Asn Gln
210 215 220

Gln Cys Pro Ser Asn Thr Gly Met Thr Asp Ser Val Arg Asp Thr Phe
225 230 235 240

sub US seq list.ST25

Leu Ser Leu His Asn Glu Phe Arg Ser Ser Val Ala Arg Gly Leu Glu
245 250 255

Pro Asp Ala Leu Gly Gly Asn Ala Pro Lys Ala Ser Lys Met Leu Lys
260 265 270

Met Val Tyr Asp Cys Glu Val Glu Ala Ser Ala Ile Arg His Gly Asn
275 280 285

Lys Cys Val Tyr Gln His Ser His Gly Asp Glu Arg Pro Gly Leu Gly
290 295 300

Glu Asn Ile Tyr Lys Thr Ser Ile Val Lys Phe Glu Lys Asn Lys Ala
305 310 315 320

Ala Lys Gln Ala Ser Gln Leu Trp Trp Asn Glu Leu Lys Glu Phe Gly
325 330 335

Val Gly Pro Ser Asn Met Leu Thr Asp Ala Trp Asn Arg Pro Asn Met
340 345 350

Gln Ile Gly His Tyr Thr Gln Met Ala Trp Glu Ser Thr Tyr Lys Leu
355 360 365

Gly Cys Ala Val Ile Phe Cys Asn Asp Phe Thr Phe Gly Val Cys Gln
370 375 380

Tyr Gly Pro Gly Gly Asn Tyr Met Asn His Leu Ile Tyr Thr Ile Gly
385 390 395 400

Gln Pro Cys Ser Glu Cys Glu Ala Thr Ala Thr Cys Ser Val Thr Glu
405 410 415

Gly Leu Cys Ser Ala Pro

sub US seq list.ST25

420

<210> 57

<211> 740

<212> DNA

<213> Ancylostoma ceylanicum

<400> 57

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740

<210> 58

<211> 217

<212> PRT

<213> Ancylostoma ceylanicum

<400> 58

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1 5 10 15

sub US seq list.ST25

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Phe Leu Asp Met His Asn Gly Tyr Arg Ser Gln Val Ala Lys Gly Gln
35 40 45

Ala Lys Asp Ala Leu Ser Gly Asn Ala Pro Lys Ala Ala Lys Met Lys
50 55 60

Lys Met Val Tyr Asp Cys Gly Val Glu Ser Thr Ala Met Gln Asn Ala
65 70 75 80

Lys Lys Cys Val Phe Thr His Ser His Met Lys Gly Leu Gly Glu Asn
85 90 95

Ile Trp Met Thr Thr Ala Arg Glu Met Asp Lys Val Lys Ser Ala Glu
100 105 110

Gln Ala Ser Gln Gly Trp Phe Ser Glu Leu Ala Glu Tyr Gly Val Gly
115 120 125

Pro Glu Asn Lys Leu Thr Met Gln Leu Trp Asn Arg Pro Asn Thr Gln
130 135 140

Ile Gly His Tyr Thr Gln Met Val Trp Gln Asp Thr Tyr Lys Leu Gly
145 150 155 160

Cys Tyr Val Glu Trp Cys Ser Ser Met Thr Tyr Gly Val Cys Gln Tyr
165 170 175

Ser Pro Gln Gly Asn Met Met Asn Ser Ile Ile Tyr Glu Lys Gly Asn
180 185 190

sub US seq list.ST25

Pro Cys Thr Gln Asp Ser Asp Cys Gly Ser Asn Ala Arg Cys Thr Ala
195 200 205

Asp Lys Ala Leu Cys Ile Val His Gly
210 215

<210> 59

<211> 1705

<212> DNA

<213> Ancylostoma ceylanicum

<400> 59

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tcaacggcac ctactcatg aaaattcgtg aaaaattcat tgcactgaga gaaaaataa 180

aggctaagct gaagctctcc ccggcacgaa aagccctact aggcgaaatt atgaagcaca 240

ttattaaat caaaaaggat aaaattcaag agaaagggtga ctcaatcgaa gaaatcaact 300

cgaaaagtgc tatcggagag ttgctgtacc aaggtgacat cgttctgaca aataagcaag 360

cccaggagat tgtgatgac attgaggggtg atgaaaatga ccgcggaaaa cgacaggcgt 420

tccgtgatcg caactatcca cggacattat ggtcgaaggg agtgtattat tacttccatg 480

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aacaaggatg ttggctgtac gttggttagga tcgggggtca gcaagatctg tcgctgggaa 660

aaggctgtga atcgggttga acagctgcac acgaaatcgg tcattgctatt ggcttctacc 720

acactcactc aagacacgat cgcgataact tcattcacatt taacgcacaa aatgtcaagc 780

ctgattggtt ggaccaattc accaagcaga ccccggttac taatgagaac tacggaatta 840

catacgacta cggaagtatt atgcactatg gcgcaaatag cgcctctgcg aatggacagc 900

sub US seq list.ST25

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<210> 60

<211> 545

<212> PRT

<213> Ancylostoma ceylanicum

<400> 60

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Lys Ile Lys Ala Ala Leu Asn Gly Thr Leu Leu Met Lys Ile Arg Glu

sub US seq list.ST25

35 40 45

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Pro Ala Arg Lys Ala Leu Leu Gly Glu Ile Met Lys His Ile Ile Lys
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Ile Lys Lys Asp Lys Ile Gln Glu Lys Gly Asp Ser Ile Glu Glu Ile
85 90 95

Asn Ser Lys Ser Ala Ile Gly Glu Leu Leu Tyr Gln Gly Asp Ile Val
100 105 110

Leu Thr Asn Lys Gln Ala Gln Glu Ile Val Asp Ile Glu Gly Asp Glu
115 120 125

Asn Asp Arg Gly Lys Arg Gln Ala Phe Arg Asp Arg Asn Tyr Pro Arg
130 135 140

Thr Leu Trp Ser Lys Gly Val Tyr Tyr Tyr Phe His Gly Asn Ala Thr
145 150 155 160

Pro Glu Val Arg Ser Val Phe Thr Lys Gly Ala Arg Leu Trp Met Lys
165 170 175

Asp Thr Cys Ile Asp Phe Phe Glu Ser Asn Ser Ala Pro Asp Arg Ile
180 185 190

Arg Val Phe Lys Glu Gln Gly Cys Trp Ser Tyr Val Gly Arg Ile Gly
195 200 205

Gly Gln Gln Asp Leu Ser Leu Gly Lys Gly Cys Glu Ser Val Gly Thr
210 215 220

sub US seq list.ST25

Ala Ala His Glu Ile Gly His Ala Ile Gly Phe Tyr His Thr His Ser
225 230 235 240

Arg His Asp Arg Asp Asn Phe Ile Thr Phe Asn Ala Gln Asn Val Lys
245 250 255

Pro Asp Trp Leu Asp Gln Phe Thr Lys Gln Thr Pro Ala Thr Asn Glu
260 265 270

Asn Tyr Gly Ile Thr Tyr Asp Tyr Gly Ser Ile Met His Tyr Gly Ala
275 280 285

Asn Ser Ala Ser Ala Asn Gly Gln Pro Ser Met Val Pro Phe Asp Pro
290 295 300

Lys Tyr Val Glu Thr Leu Gly Ser Pro Ile Ile Ser Phe Tyr Glu Leu
305 310 315 320

Leu Met Ile Asn Lys Pro Tyr Glu Cys Thr Lys Asn Cys Asp Pro Asn
325 330 335

Thr Ser Ala Gln Cys Lys Met Gly Gly Phe Pro His Pro Arg Asp Cys
340 345 350

Gly Arg Cys Ile Cys Pro Ser Gly Tyr Gly Gly Gln Leu Cys Asp Gln
355 360 365

Lys Pro Ser Gly Cys Gly Ser Ile Leu Gln Ala Thr Ala Gln Tyr Gln
370 375 380

Asn Leu His Asp Lys Arg Gly Asn Glu Ala Ala Gly Gln Arg Pro Arg
385 390 395 400

sub US seq list.ST25

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405 410 415

Arg Ile Glu Ile Lys Ile Ala Asp Leu Ser Arg Gly Ala Ala Val Asp
420 425 430

Gly Cys Gln Tyr Trp Gly Val Glu Ile Lys Thr His Ala Asp Gln Arg
435 440 445

Leu Thr Gly Tyr Arg Phe Cys Ala Pro Glu Asp Val Gly Arg Thr Leu
450 455 460

Val Ser Asn Ser Asn Ile Val Pro Ile Ile Thr Tyr Asn Phe Tyr Ala
465 470 475 480

Thr Thr Val Asp Ile Gln Tyr Arg Ile Val Gly Gly Asn Val Gly Gly
485 490 495

Pro Arg Pro Gln Pro Gln Pro Asn Ser Asn Cys Val Asp Asn Glu Gln
500 505 510

Cys Ala Thr Leu Ile Arg Thr Lys Asn Phe Cys Gln Ser Arg Ser Phe
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<210> 61

<211> 893

<212> DNA

<213> Ancylostoma ceylanicum

sub US seq list.ST25

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cagcggcggt gagaccaagc catccacgac cactgtggca ccagaacttc ctgaagacgc 660
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<210> 62

<211> 227

<212> PRT

<213> Ancylostoma ceylanicum

<400> 62

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sub US seq list.ST25

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Leu Gly Leu Ser Thr Gly Cys Val Val Thr Gly Asn Val Leu Tyr Ala
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Asn Gly Phe Arg Val Arg Glu Ile Asn Pro Ser Glu Gln Gln Glu Leu
50 55 60

Val Lys Tyr Gln Asn Asp Val Ala Glu Tyr Lys Thr Ala Leu Lys Gln
65 70 75 80

Ala Ile Lys Glu Arg Glu Glu Lys Ile Arg Ala Arg Leu Ala Gly Lys
85 90 95

Lys Val Lys Ala Val Glu Ser Thr Lys Glu Glu Asp Leu Pro Lys Pro
100 105 110

Pro Gln Lys Pro Ser Phe Cys Thr Pro Glu Asp Thr Thr Gln Phe Phe
115 120 125

Phe Glu Gly Cys Met Ile Gln Asn Asn Lys Ile Tyr Val Gly Asn Thr
130 135 140

Phe Ala Arg Asp Leu Thr Gln Ser Glu Ile Gly Glu Leu Lys Glu Phe
145 150 155 160

Glu Lys Lys Phe Lys Val Tyr Gln Asp Tyr Val Gln Lys Gln Ala Glu
165 170 175

Gln Gln Val Asn Ser Leu Phe Gly Gly Ser Asp Phe Phe Ser Ala Leu
180 185 190

Phe Ser Gly Gly Glu Thr Lys Pro Ser Thr Thr Thr Val Ala Pro Glu
195 200 205

sub US seq list.ST25

Leu Pro Glu Asp Ala Pro Glu Gln Pro Pro Thr Pro Asn Phe Cys Thr
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Arg Ile Ile
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<210> 63
 <211> 407
 <212> DNA
 <213> Ancylostoma ceylanicum

<400> 63
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 tctgagcgta cctaaacctg gcagcagaaa agtgaggttc tcctaccgg acaaatacat 360
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<210> 64
 <211> 127
 <212> PRT
 <213> Ancylostoma ceylanicum

<400> 64

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sub US seq list.ST25

Pro Ala Ala Asn Val Arg Val Lys Leu Trp Glu Glu Asp Thr Gly Pro
35 40 45

Asp Pro Asp Asp Leu Leu Asp Ala Gly Tyr Thr Asn Ser Asn Gly Glu
50 55 60

Phe Gln Leu Gln Gly Gly Thr Ile Glu Thr Thr Pro Ile Asp Pro Val
65 70 75 80

Leu Lys Ile Tyr His Asp Cys Asn Asp Val Thr Gly Phe Leu Ser Val
85 90 95

Pro Lys Pro Gly Ser Arg Lys Val Arg Phe Ser Leu Pro Asp Lys Tyr
100 105 110

Ile Ser Asp Gly Met Val Pro Lys Lys Val Met Asp Ile Gly Val
115 120 125

<210> 65

<211> 26

<212> DNA

<213> Artificial

<220>

<223> synthetic oligonucleotide primer

<400> 65

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<210> 66

<211> 25

<212> DNA

<213> Artificial

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<223> Synthetic oligonucleotide primer

sub US seq list.ST25

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25

<210> 67

<211> 425

<212> PRT

<213> Ancylostoma duodenale

<400> 67

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20 25 30

Ile Thr Asp Ser Asp Arg Gln Ala Phe Leu Asp Phe His Asn Asn Ala

35 40 45

Arg Arg Arg Val Ala Gln Gly Val Glu Asp Asn Lys Ser Gly Lys Leu

50 55 60

Asn Pro Ala Lys Asn Met Tyr Lys Leu Glu Trp Asp Cys Lys Met Glu

65 70 75 80

Gln Gln Leu Gln Asp Ala Ile Gln Ser Cys Pro Gly Gly Ser Ala Gly

85 90 95

Ile Gln Gly Phe Ser Gln Asn Val Met Ser Trp Ser Asn Ser Gly Gly

100 105 110

Phe Pro Asn Ser Ser Glu Lys Ile Glu Ser Thr Leu Ser Gly Trp Trp

115 120 125

Ser Gly Ala Lys Asn Asn Gly Val Gly Ser Asp Asn Lys Tyr Thr Gly

130 135 140

sub US seq list.ST25

Gly Gly Leu Tyr Ala Phe Ser Asn Met Val Phe Ser Glu Thr Thr Lys
145 150 155 160

Ile Gly Cys Ala Tyr Lys Val Cys Gly Thr Lys Met Ala Thr Ser Cys
 165 170 175

Ile Tyr Asn Gly Ile Gly Tyr Ile Thr Asn Ala Pro Met Trp Glu Thr
 180 185 190

Gly Gln Ala Cys Lys Thr Gly Ala Asp Cys Ser Thr Tyr Lys Asn Ser
 195 200 205

Gly Cys Glu Asp Ser Leu Cys Thr Lys Gly Ala Asp Val Pro Glu Thr
 210 215 220

Asn Gln Gln Cys Pro Ser Asn Thr Gly Met Thr Asp Ser Val Arg Asp
225 230 235 240

Thr Phe Leu Ser Leu His Asn Gly Phe Arg Ser Ser Val Ala Arg Gly
 245 250 255

Leu Glu Pro Asp Ala Leu Gly Gly Asn Ala Pro Lys Ala Ala Lys Met
 260 265 270

Leu Lys Met Val Tyr Asp Cys Glu Val Glu Ala Ser Ala Ile Arg His
 275 280 285

Gly Asn Lys Cys Val Tyr Gln His Ser Ser Gly Asn Asp Arg Pro Gly
 290 295 300

Leu Gly Glu Asn Ile Tyr Lys Thr Ser Val Gln Lys Phe Glu Lys Asn
305 310 315 320

sub US seq list.ST25

Lys Ala Ala Lys Gln Ala Ser Glu Leu Trp Trp Asn Glu Leu Arg Glu
325 330 335

Phe Gly Val Gly Pro Ser Asn Asn Leu Thr Asn Ala Leu Trp Asn Arg
340 345 350

Pro Gly Met Gln Ile Gly His Tyr Thr Gln Met Ala Trp Asp Thr Thr
355 360 365

Tyr Lys Leu Gly Cys Ala Val Val Phe Cys Asn Asp Phe Thr Phe Gly
370 375 380

Val Cys Gln Tyr Gly Pro Gly Gly Asn Tyr Met Asn His Leu Ile Tyr
385 390 395 400

Thr Met Gly Gln Pro Cys Ser Gln Cys Ala Ala Thr Ala Thr Cys Ser
405 410 415

Val Thr Glu Gly Leu Cys Ser Ala Pro
420 425

<210> 68

<211> 216

<212> PRT

<213> Ancylostoma duodenale

<400> 68

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20 25 30

Gln Glu Phe Leu Asp Val His Asn Gly Tyr Arg Ser Lys Val Ala Lys

sub US seq list.ST25

35 40 45

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Met Lys Lys Met Ile Tyr Asp Cys Asn Val Glu Ser Thr Ala Met Gln
65 70 75 80

Asp Ala Lys Lys Cys Val Phe Ala His Ser His Lys Gly Leu Gly Glu
85 90 95

Asn Ile Tyr Met Ser Thr Ala Arg Gln Met Asp Lys Ala Glu Ala Ala
100 105 110

Gln Gln Ala Ser Asp Gly Trp Phe Ala Glu Leu Ala Lys Tyr Gly Val
115 120 125

Gly Gln Glu Asn Lys Leu Thr Met Gln Leu Trp Asn Arg Gly Val Met
130 135 140

Ile Gly His Tyr Thr Gln Met Val Trp Gln Glu Ser Tyr Lys Leu Gly
145 150 155 160

Cys Tyr Val Glu Trp Cys Pro Ser Met Thr Tyr Gly Val Cys Gln Tyr
165 170 175

Ser Pro Gln Gly Asn Met Met Asn Ser Ile Ile Tyr Glu Lys Gly Asn
180 185 190

Pro Cys Thr Gln Asp Ser Asp Cys Gly Ser Asn Ala Lys Cys Ser Ser
195 200 205

Gly Glu Ala Leu Cys Ile Val Gln
210 215

sub US seq list.ST25

<210> 69

<211> 207

<212> PRT

<213> Necator americanus

<400> 69

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20 25 30

Phe Leu Glu Leu His Asn Ser Leu Arg Ser Ser Val Ala Leu Gly Gln
35 40 45

Ala Lys Asp Gly Ala Gly Gly Asn Ala Pro Lys Ala Ala Lys Met Lys
50 55 60

Thr Met Ala Tyr Asp Cys Glu Val Glu Lys Thr Ala Met Asn Asn Ala
65 70 75 80

Lys Gln Cys Val Phe Lys His Ser Gln Pro Asn Gln Arg Lys Gly Leu
85 90 95

Gly Glu Asn Ile Phe Met Ser Ser Asp Ser Gly Lys Ala Lys Ala Ala
100 105 110

Glu Gln Ala Ser Lys Ala Trp Phe Gly Glu Leu Ala Glu Lys Gly Val
115 120 125

Gly Gln Asn Leu Lys Leu Thr Gly Gly Leu Phe Ser Arg Gly Val Gly
130 135 140

sub US seq list.ST25

His Tyr Thr Gln Met Val Trp Gln Glu Thr Val Lys Leu Gly Cys Tyr
145 150 155 160

Val Glu Ala Cys Ser Asn Met Cys Tyr Val Val Cys Gln Tyr Gly Pro
165 170 175

Ala Gly Asn Met Met Gly Lys Asp Ile Tyr Glu Lys Gly Glu Pro Cys
180 185 190

Ser Lys Cys Glu Asn Cys Asp Lys Glu Lys Gly Leu Cys Ser Ala
195 200 205

<210> 70
<211> 31
<212> DNA
<213> Artificial

<220>
<223> Synthetic oligonucleotide primer

<400> 70
ctctcgagaa aagaagccca gtaaagccag c 31

<210> 71
<211> 28
<212> DNA
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<220>
<223> Synthetic oligonucleotide primer

<400> 71
tgtctagagg agcactgcac aatccttc 28

<210> 72
<211> 27
<212> DNA
<213> Artificial

sub US seq list.ST25

<220>

<223> Synthetic oligonucleotide primer

<400> 72

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27

<210> 73

<211> 26

<212> DNA

<213> Artificial

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<223> Synthetic oligonucleotide primer

<400> 73

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26

<210> 74

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<400> 74

gcaaattggca ttctgacatc c

21

<210> 75

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<400> 75

tactattgcc agcattgctg c

21

<210> 76

<211> 678

sub US seq list.ST25

<212> DNA

<213> Ancylostoma caninum

<400> 76

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 tgaggatatt cgtgttacac atgaggattt ccccgagata aaaccaaatt tgccattgg 180
 acaactgccg ctgcttaacg aggatggtaa agaactcgt cagtcaaacg ccatcaatcg 240
 ttacctggct aggaaattcg gattcgctgg caaacgccca ttgaggagg ctctagtga 300
 ctgctggca gatcagatga cggactaccg ttagaaata aaaccattcg tctatacagc 360
 gtatggacat cagaaattcg gtgacctgga gacgctaaa aaggatgtga tgcttcctgc 420
 acgagacaag ttctcgggt tcatcaccaa attcttaaag aacaacccat caggattctt 480
 ggttggtgac tcggtgactt ggatagatct gttgcttgc gaacatgctt ccgacataca 540
 gtcaaaggtc cccgaatacc tcgaagggtt tctgaggtg aaggctcata tggaaaaggt 600
 gcgatctatt ccgaaactga aaaaatggat cgagaccaga ccggagactc acttctgatc 660
 gatacgcggg atttttc 678

<210> 77

<211> 207

<212> PRT

<213> Ancylostoma caninum

<400> 77

Met Val His Tyr Lys Leu Thr Tyr Phe Asn Gly Arg Gly Leu Gly Glu
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Cys Ala Arg Gln Leu Phe Ala Leu Ala Asp Gln Gln Tyr Glu Asp Ile
 20 25 30

Arg Val Thr His Glu Asp Phe Pro Glu Ile Lys Pro Asn Leu Pro Phe

sub US seq list.ST25

35 40 45

Gly Gln Leu Pro Leu Leu Asn Glu Asp Gly Lys Glu Leu Ala Gln Ser
50 55 60

Asn Ala Ile Asn Arg Tyr Leu Ala Arg Lys Phe Gly Phe Ala Gly Lys
65 70 75 80

Thr Pro Phe Glu Glu Ala Leu Val Asp Ser Leu Ala Asp Gln Met Thr
85 90 95

Asp Tyr Arg Val Glu Ile Lys Pro Phe Val Tyr Thr Ala Tyr Gly His
100 105 110

Gln Lys Phe Gly Asp Leu Glu Thr Leu Lys Lys Asp Val Met Leu Pro
115 120 125

Ala Arg Asp Lys Phe Leu Gly Phe Ile Thr Lys Phe Leu Lys Asn Asn
130 135 140

Pro Ser Gly Phe Leu Val Gly Asp Ser Val Thr Trp Ile Asp Leu Leu
145 150 155 160

Leu Ala Glu His Ala Ser Asp Ile Gln Ser Lys Val Pro Glu Tyr Leu
165 170 175

Glu Gly Phe Pro Glu Val Lys Ala His Met Glu Lys Val Arg Ser Ile
180 185 190

Pro Lys Leu Lys Lys Trp Ile Glu Thr Arg Pro Glu Thr His Phe
195 200 205

<210> 78

<211> 16

sub US seq list.ST25

<212> DNA
<213> Artificial

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<400> 78
gctctccggc tggtagg 16

<210> 79
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Synthetic oligonucleotide primer

<400> 79
ttaaggagcg ctgcacaagc c 21

<210> 80
<211> 28
<212> DNA
<213> Artificial

<220>
<223> Synthetic oligonucleotide primer

<400> 80
gggaattcaa ttctatgaga tgcggaaa 28

<210> 81
<211> 28
<212> DNA
<213> Artificial

<220>
<223> Synthetic oligonucleotide primer

<400> 81
tgtctagata gccagccacg acgcaaag 28

sub US seq list.ST25

<210> 82

<211> 753

<212> DNA

<213> Necator americanus

<400> 82

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caaagccggt tgcctgaca atggaatgtc agaggaagca cggcaaaaat tccttgaatt 120
gcacaattcg ttgagaagtt cggttgcatt gggacaggcc aaggatggag ctggtggaaa 180
tgccccgaaa gctgctaaga tgaagacgat ggcatatgat tgcgaagttg aaaagactgc 240
aatgaataac gcgaacaat gtgtattcaa gactcgcga cctaaccaaa ggaaaggatt 300
gggagagaat atatttatgt ctctggatag cggatatggac aaagcaaagg ctgctgagca 360
ggctagcaaa gcttgggtcg gcgaacttgc agaaaaagga gttggacaga atcttaagct 420
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atgtgagaat tgcgacaagg agaagggact ctgcagtgtc tgattagttg tgttcagtga 660
agctcattac gctcacatac ttaacaaat cgtagtgtac ttagttgtc ttaatattca 720
aataaacatg atgccagcaa aaaaaaaaaa aaa 753

<210> 83

<211> 1134

<212> DNA

<213> Necator americanus

<400> 83

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tatgctagaa gactcacagg gcaggccctt gttgactacg tcaattcgca ccactcattg 180

sub US seq list.ST25

tacaaggcca aatattcacc agatgctcaa gaacgcatga aatctagaat tatggattg 240
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 ctcgctgttt cttacctga aagtttcgac gctcgtgaaa aatggccaga atgtccttca 360
 ataggattaa tccgtgatca gtccgccggt ggaggatgtt gggcagtatc ctcagcagag 420
 gtgatgaccg acaggatctg tatacaatca aatggaacaa agcaggtgta tgtttccgaa 480
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 tatggaccat gtccagatgg tatgtggcct acgccaacat gcgaaaaggc atgtcaatcc 720
 gactatactg ttccgtacaa cgatgacagg atcttcggca gcaaaactat tgtcttgacg 780
 ggagaggaaa aaattaagcg agagatttcc aataacggac cattggtagc cacgtataca 840
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 ttgattgcaa actcgtggaa cactgattgg ggagagaatg gcttcttccg catgcttctg 1020
 ggaacaaacc ttgcgatat tgaactaagc gcgactggag gaacgttcaa ggtgtgaacg 1080
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<210> 84

<211> 347

<212> PRT

<213> Necator americanus

<400> 84

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1 5 10 15

sub US seq list.ST25

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20 25 30

Arg Leu Thr Gly Gln Ala Leu Val Asp Tyr Val Asn Ser His His Ser
35 40 45

Leu Tyr Lys Ala Lys Tyr Ser Pro Asp Ala Gln Glu Arg Met Lys Ser
50 55 60

Arg Ile Met Asp Leu Ser Phe Met Val Asp Ala Glu Val Met Met Glu
65 70 75 80

Glu Met Asp Gln Gln Glu Asp Ile Asp Leu Ala Val Ser Leu Pro Glu
85 90 95

Ser Phe Asp Ala Arg Glu Lys Trp Pro Glu Cys Pro Ser Ile Gly Leu
100 105 110

Ile Arg Asp Gln Ser Ala Gly Gly Gly Cys Trp Ala Val Ser Ser Ala
115 120 125

Glu Val Met Thr Asp Arg Ile Cys Ile Gln Ser Asn Gly Thr Lys Gln
130 135 140

Val Tyr Val Ser Glu Thr Asp Ile Leu Ser Cys Cys Gly Gln Arg Cys
145 150 155 160

Gly Ser Gly Cys Thr Ser Gly Val Pro Arg Gln Ala Phe Asn Tyr Ala
165 170 175

Ile Arg Lys Gly Val Cys Ser Gly Gly Pro Tyr Gly Thr Lys Gly Val
180 185 190

Cys Lys Pro Tyr Pro Phe Tyr Pro Cys Gly Tyr His Ala His Leu Pro

sub US seq list.ST25

195 200 205

Tyr Tyr Gly Pro Cys Pro Asp Gly Met Trp Pro Thr Pro Thr Cys Glu
210 215 220

Lys Ala Cys Gln Ser Asp Tyr Thr Val Pro Tyr Asn Asp Asp Arg Ile
225 230 235 240

Phe Gly Ser Lys Thr Ile Val Leu Thr Gly Glu Glu Lys Ile Lys Arg
245 250 255

Glu Ile Phe Asn Asn Gly Pro Leu Val Ala Thr Tyr Thr Val Tyr Glu
260 265 270

Asp Phe Ala Tyr Tyr Lys Asn Gly Ile Tyr Met Thr Gly Leu Gly Arg
275 280 285

Ala Thr Gly Ala His Ala Val Lys Ile Ile Gly Trp Gly Glu Glu Asn
290 295 300

Gly Val Lys Tyr Trp Leu Ile Ala Asn Ser Trp Asn Thr Asp Trp Gly
305 310 315 320

Glu Asn Gly Phe Phe Arg Met Leu Arg Gly Thr Asn Leu Cys Asp Ile
325 330 335

Glu Leu Ser Ala Thr Gly Gly Thr Phe Lys Val
340 345

<210> 85

<211> 1177

<212> DNA

<213> Necator americanus

<400> 85

sub US seq list.ST25

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tttctgaaca aacgacaatc gtttttcacg gctaagtaca cgccaaatgc tttaaactt 180
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cccaaatgca cctccatagg atttatccgt gatcaatcac actgtggttc atgctgggca 360
gtatcgtcag cagaaacgat gtcagatcga ctctgcgtgc aatcaaacgg tacaattaag 420
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<210> 86

<211> 360

<212> PRT

<213> Necator americanus

sub US seq list.ST25

<400> 86

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20 25 30

Leu Ser Gly Glu Ala Phe Ala Glu Phe Leu Asn Lys Arg Gln Ser Phe
35 40 45

Phe Thr Ala Lys Tyr Thr Pro Asn Ala Leu Asn Ile Leu Lys Met Arg
50 55 60

Val Met Glu Ser Arg Phe Leu Asp Asn Glu Glu Gly Glu Met Leu Lys
65 70 75 80

Glu Glu Asp Met Asp Phe Ser Glu Glu Ile Pro Val Ser Phe Asp Ala
85 90 95

Arg Asp Lys Trp Pro Lys Cys Thr Ser Ile Gly Phe Ile Arg Asp Gln
100 105 110

Ser His Cys Gly Ser Cys Trp Ala Val Ser Ser Ala Glu Thr Met Ser
115 120 125

Asp Arg Leu Cys Val Gln Ser Asn Gly Thr Ile Lys Val Leu Leu Ser
130 135 140

Asp Thr Asp Ile Leu Ala Cys Cys Pro Asn Cys Gly Ala Gly Cys Gly
145 150 155 160

Gly Gly His Thr Ile Arg Ala Trp Glu Tyr Phe Lys Asn Thr Gly Val
165 170 175

sub US seq list.ST25

Cys Thr Gly Gly Leu Tyr Gly Thr Lys Asp Ser Cys Lys Pro Tyr Ala
180 185 190

Phe Tyr Pro Cys Lys Asp Glu Ser Tyr Gly Lys Cys Pro Lys Asp Ser
195 200 205

Phe Pro Thr Pro Lys Cys Arg Lys Ile Cys Gln Tyr Lys Tyr Ser Lys
210 215 220

Lys Tyr Ala Asp Asp Lys Tyr Tyr Ala Asn Ser Ala Tyr Arg Ile Pro
225 230 235 240

Gln Asn Glu Thr Trp Ile Lys Leu Glu Ile Met Arg Asn Gly Pro Val
245 250 255

Thr Ala Ser Phe Arg Ile Tyr Pro Asp Phe Gly Phe Tyr Glu Lys Gly
260 265 270

Val Tyr Val Thr Ser Gly Gly Arg Glu Leu Gly Gly His Ala Ile Lys
275 280 285

Ile Ile Gly Trp Gly Thr Glu Lys Val Asn Gly Thr Asp Leu Pro Tyr
290 295 300

Trp Leu Ile Ala Asn Ser Trp Gly Thr Asp Trp Gly Glu Asn Asn Gly
305 310 315 320

Tyr Phe Arg Ile Leu Arg Gly Gln Asn His Cys Gln Ile Glu Gln Lys
325 330 335

Val Ile Ala Gly Met Ile Lys Val Pro Gln Pro Lys Ser Ala Gly Pro
340 345 350

sub US seq list.ST25

Pro Leu Gln Pro Asn Pro Ser Ser
355 360

<210> 87

<211> 1181

<212> DNA

<213> Necator americanus

<400> 87

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gctgctgccc ttctggcaat aaaccagtta tatgcagatg agctgcttca caaacaagag 180

tccgaacacg gacttagtgg ccaagcgctc gttgactacg ttaattcgca ccaatcactt 240

ttcaaaacag aatattcgcc aaccaatgaa caattcgta aagcccgtat aatggacata 300

aagtatatga ctgaggctag ccacaaatat ccaagaaagg gcattaatct gaacgttgaa 360

ctccctgaaa ggtttgacgc acgtgaaaaa tggccacatt ggcctccat cgtctcatt 420

cgcgatcact ctgcttgagg atcgtgttgg gctgtatcgg cagegtcgtt tatgtcagat 480

cgactctgta tccagacgaa cggcacaac cagaagatcc ttctgtggc ggacatcctt 540

gcgtgttgtg gagaagactg tggctcagga tgcgaaggcg gttatccgat tcaggcgtac 600

ttctacctgg aaaatactgg agtatgtagt ggaggagagt atcgagaaaa gaatgtatgc 660

aaaccatatc cttttatcc gtgtgacgga aactatggac catgccccaa ggagggtgcg 720

ttcgacactc caaagtgtcg gaaaatatgt cagttccgat atcctgttcc atacgaagaa 780

gataaagtgt ttgaaaaaa ttcacacatc cttctgcaag acaacgaggc aagaatcaga 840

caggaaattt tcaaaaacgg accagtggga gctaattttt acgttttcga agactttata 900

cactacaagg aagggtattt taagcagaca tatgggaaat ggataggagt acatgcaatc 960

aaacttattg gttggggcac agaaaatgga acagattatt ggttggttgc taactcgtac 1020

sub US seq list.ST25

aactacgact ggggagagaa tggcaccttc cgcattcttc gtggaactaa tcactgtttg 1080

atagaatcac aagtgatcgc aacggagatg attgtatgaa tgtctaatac acgattgggc 1140

gcatgccgat ctctgaagta aaatgtgtta atcaaaaaaa a 1181

<210> 88

<211> 339

<212> PRT

<213> Necator americanus

<400> 88

Met Lys Ala Asn Phe Ala Leu Val Val Val Leu Leu Ala Ile Asn Gln
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Leu Tyr Ala Asp Glu Leu Leu His Lys Gln Glu Ser Glu His Gly Leu
20 25 30

Ser Gly Gln Ala Leu Val Asp Tyr Val Asn Ser His Gln Ser Leu Phe
35 40 45

Lys Thr Glu Tyr Ser Pro Thr Asn Glu Gln Phe Val Lys Ala Arg Ile
50 55 60

Met Asp Ile Lys Tyr Met Thr Glu Ala Ser His Lys Tyr Pro Arg Lys
65 70 75 80

Gly Ile Asn Leu Asn Val Glu Leu Pro Glu Arg Phe Asp Ala Arg Glu
85 90 95

Lys Trp Pro His Cys Ala Ser Ile Gly Leu Ile Arg Asp His Ser Ala
100 105 110

Cys Gly Ser Cys Trp Ala Val Ser Ala Ala Ser Val Met Ser Asp Arg
115 120 125

sub US seq list.ST25

Leu Cys Ile Gln Thr Asn Gly Thr Asn Gln Lys Ile Leu Ser Ser Ala
130 135 140

Asp Ile Leu Ala Cys Cys Gly Glu Asp Cys Gly Ser Gly Cys Glu Gly
145 150 155 160

Gly Tyr Pro Ile Gln Ala Tyr Phe Tyr Leu Glu Asn Thr Gly Val Cys
165 170 175

Ser Gly Gly Glu Tyr Arg Glu Lys Asn Val Cys Lys Pro Tyr Pro Phe
180 185 190

Tyr Pro Cys Asp Gly Asn Tyr Gly Pro Cys Pro Lys Glu Gly Ala Phe
195 200 205

Asp Thr Pro Lys Cys Arg Lys Ile Cys Gln Phe Arg Tyr Pro Val Pro
210 215 220

Tyr Glu Glu Asp Lys Val Phe Gly Lys Asn Ser His Ile Leu Leu Gln
225 230 235 240

Asp Asn Glu Ala Arg Ile Arg Gln Glu Ile Phe Ile Asn Gly Pro Val
245 250 255

Gly Ala Asn Phe Tyr Val Phe Glu Asp Phe Ile His Tyr Lys Glu Gly
260 265 270

Ile Tyr Lys Gln Thr Tyr Gly Lys Trp Ile Gly Val His Ala Ile Lys
275 280 285

Leu Ile Gly Trp Gly Thr Glu Asn Gly Thr Asp Tyr Trp Leu Val Ala
290 295 300

sub US seq list.ST25

Asn Ser Tyr Asn Tyr Asp Trp Gly Glu Asn Gly Thr Phe Arg Ile Leu
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Arg Gly Thr Asn His Cys Leu Ile Glu Ser Gln Val Ile Ala Thr Glu
325 330 335

Met Ile Val

<210> 89

<211> 1236

<212> DNA

<213> Necator americanus

<400> 89

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caaacattca agagaagcat gataaccatc attaccctat tgcttatcgc ttctacagtg 180

aagtcactaa cagtggagga gtacttgccc cgaccagtgc cggaatatgc cacaaaactg 240

acaggacaag cctacgttga ctatgttaat cagcatcaat cattctacaa ggctgaatat 300

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aacaaaaatt atgtggtgaa ggacgtagat ctaaacatca atcttcaga aaccttcgac 420

gcaagggaaa aatggccaaa ctgcacatca ataaggacaa ttgcgatca gtccaattgt 480

ggatcatgtt gggcagtatc agcggcgtcg gtaatgtcag atcgtttatg catacagtcg 540

aacggcacia tacagtcatg ggcttctgat acggatattc tatcatgttg ctggaattgc 600

ggaatgggat gcgatggagg tagaccgttt gcggcggttct ttttcgcat agacaatggt 660

gtatgcactg gaggaccttt cagagagcca aacgtgtgca aaccatacgc ttctatcca 720

tgcggtcgcc accaaaacca gaaatacttc ggaccttgtc caaaagagct ctggcccact 780

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sub US seq list.ST25

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<210> 90

<211> 342

<212> PRT

<213> Necator americanus

<400> 90

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 20 25 30

Lys Leu Thr Gly Gln Ala Tyr Val Asp Tyr Val Asn Gln His Gln Ser
 35 40 45

Phe Tyr Lys Ala Glu Tyr Ser Pro Leu Val Glu Gln Tyr Ala Lys Ala
 50 55 60

Val Met Arg Ser Glu Phe Met Thr Lys Pro Asn Gln Asn Tyr Val Val
 65 70 75 80

Lys Asp Val Asp Leu Asn Ile Asn Leu Pro Glu Thr Phe Asp Ala Arg
 85 90 95

sub US seq list.ST25

Glu Lys Trp Pro Asn Cys Thr Ser Ile Arg Thr Ile Arg Asp Gln Ser
100 105 110

Asn Cys Gly Ser Cys Trp Ala Val Ser Ala Ala Ser Val Met Ser Asp
115 120 125

Arg Leu Cys Ile Gln Ser Asn Gly Thr Ile Gln Ser Trp Ala Ser Asp
130 135 140

Thr Asp Ile Leu Ser Cys Cys Trp Asn Cys Gly Met Gly Cys Asp Gly
145 150 155 160

Gly Arg Pro Phe Ala Ala Phe Phe Phe Ala Ile Asp Asn Gly Val Cys
165 170 175

Thr Gly Gly Pro Phe Arg Glu Pro Asn Val Cys Lys Pro Tyr Ala Phe
180 185 190

Tyr Pro Cys Gly Arg His Gln Asn Gln Lys Tyr Phe Gly Pro Cys Pro
195 200 205

Lys Glu Leu Trp Pro Thr Pro Lys Cys Arg Lys Met Cys Gln Leu Lys
210 215 220

Tyr Asn Val Ala Tyr Lys Asp Asp Lys Ile Tyr Gly Asn Asp Ala Tyr
225 230 235 240

Ser Leu Pro Asn Asn Glu Thr Arg Ile Met Gln Glu Ile Phe Thr Asn
245 250 255

Gly Pro Val Val Gly Ser Phe Ser Val Phe Ala Asp Phe Ala Ile Tyr
260 265 270

sub US seq list.ST25

Lys Lys Gly Val Tyr Val Ser Asn Gly Ile Gln Gln Asn Gly Ala His
275 280 285

Ala Val Lys Ile Ile Gly Trp Gly Val Gln Asp Gly Leu Lys Tyr Trp
290 295 300

Leu Ile Ala Asn Ser Trp Asn Asn Asp Trp Gly Asp Glu Gly Tyr Val
305 310 315 320

Arg Phe Leu Arg Gly Asp Asn His Cys Gly Ile Glu Ser Arg Val Val
325 330 335

Thr Gly Thr Met Lys Val
340

<210> 91

<211> 2709

<212> DNA

<213> Necator americanus

<400> 91

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tcgtacgata atgtgtccga actatggagt ttcagacaac tcatacgcat accaggaagc 420

agcatcgttc attcttagtg gcctcgacga acgtgtcaat ccgtgcgaag atttctacgc 480

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sub US seq list.ST25

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sub US seq list.ST25

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<210> 92

<211> 878

<212> PRT

<213> Necator americanus

<400> 92

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sub US seq list.ST25

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Arg Val Ser Ala Lys Thr Ile Ser Pro Arg Ser Ser Ala Thr Thr Ser
85 90 95

Thr Arg Thr Leu Arg Thr Leu Thr Thr Pro Lys Phe Val Ala Thr Glu
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Ala Ala Pro Arg Arg Asn Arg Thr Ile Met Cys Pro Asn Tyr Gly Val
115 120 125

Ser Asp Asn Ser Tyr Ala Tyr Gln Glu Ala Ala Ser Phe Ile Leu Ser
130 135 140

Gly Leu Asp Glu Arg Val Asn Pro Cys Glu Asp Phe Tyr Ala Phe Thr
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Cys Asn Lys Phe Leu Lys Asp His Lys Ala Glu Glu His Gly Val Ser
165 170 175

Arg Tyr Gly Ala Ile Lys Glu Leu Gln Asp Ala Val Asn Thr Glu Ile
180 185 190

Val Asp Ala Leu Phe Asp Val Asp Val Asn Asp Lys Lys Arg Ser Glu
195 200 205

Thr Glu Arg Ile Thr Lys Ala Leu Leu His Asp Cys Val Tyr His Ile

sub US seq list.ST25

210 215 220

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Asp Phe Asp Val Phe Ala Ala Met Gly Glu Val Glu Gln Asn His Ala
260 265 270

Met Gly Thr Leu Phe Ser Ala Met Val Ser Val Asp Tyr Lys Lys Ile
275 280 285

Lys Gln Asn Ser Leu Phe Leu Ser Gln Pro Arg Leu Pro Met Pro Arg
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Glu Phe Tyr Val Leu Pro Gln Phe Thr Met Lys Leu Lys Lys Arg Gly
305 310 315 320

Leu Gln Ile Ala Asp Val Leu Lys Lys Phe Ala Glu Lys Ile Leu Glu
325 330 335

Glu Pro Asp Lys Tyr Arg Asp Met Ile Glu Lys Ala Ala Gln Asp Val
340 345 350

Val Glu Leu Glu Arg Arg Ile Ala Leu Ala Ser Trp Ala Asp Ala Glu
355 360 365

Met Arg Asn Tyr Ala Gln Gln Tyr Asn Pro Tyr Asp Leu Pro Thr Leu
370 375 380

Lys Lys Ala Tyr Pro Ser Val Lys Trp Glu Ser Tyr Leu Arg Ser Leu
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sub US seq list.ST25

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Leu Ile Phe Glu Asp Ala Glu Phe Leu Gly Gly Ile Phe Lys Glu Ser
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Ala Glu Asp Leu Asn Tyr Val Arg Tyr Ala Gln Arg Ser Gly Arg Gly
465 470 475 480

Val Ala Arg Val Gly Arg Gln Leu Met His Gln Arg Asp Thr Arg Gly
485 490 495

Asp Pro Asn Ile Pro Cys Met Asn Phe Ile Met Thr Tyr Met Pro Tyr
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Gly Pro Gly Tyr Val Tyr Val Arg Ser Lys Gln Gln Arg Asn Asp Val
515 520 525

Gln Ala Asp Ile Arg Lys Gln Thr Glu Leu Val Ile Glu Ser Phe Leu
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Asn Met Thr Ser Gly Leu Lys Trp Met Ser Ser Asp Ser Lys Glu Lys
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Ala Arg Gln Lys Ala Lys Gly Met Val Arg Asn Tyr Gly Trp Pro Gln
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sub US seq list.ST25

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Lys Lys Asp Tyr Ala Glu Ile Leu Glu Leu Thr Lys Thr Glu Arg Ser
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Ser Leu Arg Tyr Tyr Arg Met Arg Arg Val Leu Ile Lys Gly Tyr Ser
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Asn Arg Glu Ser Leu Arg Leu Leu Leu Gln Asp Ala Asp Arg Ser Asn
625 630 635 640

Phe Leu Leu Ser Pro Ala Leu Val Ser Ala Trp Tyr Gln Pro Glu Arg
645 650 655

Asn Ser Ile Thr Phe Pro Tyr Ala Ser Phe Asn Pro Pro Tyr Tyr Ser
660 665 670

Tyr Glu Tyr Pro Gln Ala Tyr Asn Tyr Gly Gly Gln Gly Gly Thr Ala
675 680 685

Gly His Glu Leu Val His Gly Phe Asp Asp Gln Gly Val Gln Phe Gly
690 695 700

Pro Asp Gly Ser Leu Ser Arg Cys Thr Ser Glu Gln Ile Asp Asn Trp
705 710 715 720

Tyr Asp Cys Gly Trp Met Asp Lys Arg Ser Lys Asp Gly Phe Asn Asp
725 730 735

Met Ala Gln Cys Val Val Thr His Tyr Ser Thr Phe Cys Cys Pro Glu
740 745 750

sub US seq list.ST25

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785 790 795 800

Glu Arg Tyr Thr Pro Asn Gln Ile Phe Trp Ile Thr Tyr Gly Tyr Ser
805 810 815

Trp Cys Arg Ser Val Thr Glu Glu Tyr Leu Ile Ser Gln Leu Leu Thr
820 825 830

Asp Pro His Ala Pro Ser Ala Cys Arg Thr Asn Gln Val Val Gln Ser
835 840 845

Ile Pro Ala Phe Gly Arg Asp Phe Gly Cys Ser Leu Gly Asp Arg Met
850 855 860

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<210> 93

<211> 551

<212> DNA

<213> Ancylostoma caninum

<400> 93

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sub US seq list.ST25

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<210> 94
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 <212> PRT
 <213> Ancylostoma caninum
 <400> 94

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 35 40 45

Thr Asp Ala Gln Ile Asp Ala Lys Val Lys Gly Trp Ile Gly Lys Gln
 50 55 60

Ser Gln Asp Ile Gln Asn Ala Phe Asn Ala Phe Glu Ser Glu Val Lys
 65 70 75 80

Ala Ala Gln Gln Gln Gly Glu Gln Ala His Gln Ala Ala Val Ala Lys
 85 90 95

sub US seq list.ST25

Phe Ser Ala Glu Ala Lys Ala Ala Asp Ala Lys Leu Thr Ala Ile Ala
100 105 110

Asn Asp Ala Ser Lys Thr Asn Ala Gln Lys Gly Ala Glu Ile Asp Ala
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Met Lys Gly
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<210> 95
<211> 482
<212> DNA
<213> Ancylostoma ceylanicum

<400> 95
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<210> 96
<211> 147
<212> PRT
<213> Ancylostoma ceylanicum

sub US seq list.ST25

<400> 96

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Thr Asp Ala Gln Ile Asp Ala Lys Val Lys Gly Trp Ile Gly Lys Gln
50 55 60

Ser Gln Asp Ile Gln Asn Ala Phe Asn Ala Phe Glu Ser Glu Val Lys
65 70 75 80

Ala Ala Gln Gln Gln Gly Glu Gln Ala His Gln Ala Ala Val Ala Lys
85 90 95

Phe Ser Ala Glu Ala Lys Ala Ala Asp Ala Lys Leu Thr Ala Ile Ala
100 105 110

Asn Asp Ala Ser Lys Thr Asn Ala Gln Lys Gly Ala Glu Ile Asp Ala
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Val Leu Lys Gly Leu Pro Gln Lys Val Arg Asp Glu Ile Glu Asn Ala
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<210> 97

<211> 1093

sub US seq list.ST25

<212> DNA

<213> Ancylostoma caninum

<400> 97

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<210> 98

<211> 343

sub US seq list.ST25

<212> PRT

<213> Ancylostoma caninum

<400> 98

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35 40 45

Phe Tyr Arg Ala Glu Tyr Ser Pro Glu Ala Glu Ala Phe Val Lys Ala
50 55 60

Arg Ile Met Asp Ser Lys Tyr Leu Val Glu Pro Lys Lys Glu Glu Val
65 70 75 80

Leu Glu Asp Val Tyr Gly Asn Asp Pro Pro Ala Ser Phe Asp Ala Arg
85 90 95

Thr His Trp Pro Glu Cys Arg Ser Ile Gly Thr Ile Arg Asp Gln Ser
100 105 110

Ser Cys Gly Ser Cys Trp Ala Val Ser Ser Ala Glu Ala Met Ser Asp
115 120 125

Glu Ile Cys Val Gln Ser Asn Ser Thr Ile Arg Val Met Ile Ser Asp
130 135 140

Ser Asp Ile Leu Ser Cys Cys Gly Ile Ser Cys Gly Tyr Gly Cys Gln
145 150 155 160

sub US seq list.ST25

Gly Gly Trp Pro Ile Glu Ala Tyr Lys Trp Met Gln Arg Asp Gly Val
165 170 175

Val Thr Gly Gly Lys Tyr Arg Gln Lys Lys Val Cys Lys Pro Tyr Ala
180 185 190

Phe Tyr Pro Cys Gly His His Gln Asn Asp Pro Tyr Tyr Gly Pro Cys
195 200 205

Pro Gly Gly Leu Trp Pro Thr Pro Lys Cys Arg Lys Thr Cys Gln Arg
210 215 220

Lys Tyr Asn Lys Ser Tyr Gln Glu Asp Lys His Phe Ala Thr Arg Ala
225 230 235 240

Tyr Tyr Leu Pro Asn Asn Glu Arg Asn Ile Arg Gln Glu Ile Tyr Lys
245 250 255

Asn Gly Pro Val Val Ala Ala Phe Arg Val Tyr Gln Asp Phe Ser Tyr
260 265 270

Tyr Lys Lys Gly Ile Tyr Val His Lys Trp Gly Gly Gln Thr Gly Ala
275 280 285

His Ala Val Lys Val Val Gly Trp Gly Arg Glu Asn Ala Thr Asp Tyr
290 295 300

Trp Leu Ile Ala Asn Ser Trp Asn Thr Asp Trp Gly Glu Ser Gly Tyr
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Phe Arg Ile Val Arg Gly Thr Asn Glu Cys Gly Ile Glu Ala Gln Met
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sub US seq list.ST25

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<210> 99

<211> 495

<212> DNA

<213> Ancylostoma caninum

<400> 99

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<210> 100

<211> 143

<212> PRT

<213> Ancylostoma caninum

<400> 100

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Asp Pro Glu His Met Ala Arg Ala Trp Lys Ala Ala Lys Gly Ile Asn
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sub US seq list.ST25

Glu Asp Ala Ser Asn Ala Gly Pro Tyr His Met Ile Pro Ile Lys Ile
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Val Lys Ala Glu Ser Gln Val Val Ala Gly Val Arg Tyr Ile Phe Glu
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85 90 95

Glu Leu Ser Ala Ser Asn Cys Glu Leu Lys Glu Gly Gly Asn Arg Ala
100 105 110

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<210> 101

<211> 2540

<212> DNA

<213> Ancylostoma caninum

<400> 101

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sub US seq list.ST25

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sub US seq list.ST25

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<210> 102

<211> 823

<212> PRT

<213> Ancylostoma caninum

<400> 102

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sub US seq list.ST25

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85 90 95

Ala Ala Lys Val Ala Ile Ser Phe Phe Gln Glu Ser Val Asn Thr Ser
100 105 110

Val Asp Pro Cys Glu Asp Phe Tyr Lys Tyr Ala Cys Gly Lys Tyr Gln
115 120 125

Lys Ala Val Ser Phe His Tyr Ala Asp Ala Lys Asn Leu Val Ala Met
130 135 140

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145 150 155 160

Thr Ala Leu Thr Lys Glu Lys Ala Phe Phe Asp Ala Cys Val Ala Ala
165 170 175

Thr Lys Asp Ser Gly His Asn Asn Gln Ile Leu Ile Ser Asn Asn Tyr
180 185 190

Leu Met Lys Arg Val Arg Lys Leu Ala Asp Tyr Leu Gly Ala Glu Phe
195 200 205

Thr Tyr Ala Leu Gly Gly Arg Val Glu Arg Leu Pro Asn Lys Val Gln
210 215 220

sub US seq list.ST25

Leu Ala Asn Ala Leu Gly Tyr Leu Ser Phe Asp Gln Asn Ile Gln Thr
225 230 235 240

Leu Val Thr Pro Leu Val Asp Thr Tyr Trp Pro Asp Pro Asn Lys Gly
 245 250 255

Tyr Thr Met Phe Leu Asp Gln Asn Thr Ala Tyr Met Ser Lys Thr Phe
 260 265 270

Tyr His Pro Asp Ala Phe Lys Thr Ile Lys Glu Asn Tyr Ile Asn Ser
 275 280 285

Ala Thr Lys Val Ile Glu Thr Phe Val Lys Thr Gln Asn Lys Pro Ile
 290 295 300

Asp Pro Lys Leu Lys Asp Lys Val Arg Gly Leu Val Glu Phe Glu Gln
305 310 315 320

Met Ile Ala Asn Lys Tyr Ser Thr Asp Asp Asp Thr Arg Arg Ile Tyr
 325 330 335

Leu Arg Ser Trp Asn Leu Arg Ser Ile Arg Glu Leu Gln Asn Gln Phe
 340 345 350

Gly Phe Val Asp Trp Gln Thr Tyr Met Lys Met Val Pro Met Val Ala
 355 360 365

Gln Asn Lys Val Gln Ser Ala Asp Phe Arg Val Ser Val Met Glu Pro
 370 375 380

Gly Gln Tyr Ala Asn Met Ser Arg Asp Tyr Ala Gly Phe Asp Lys Glu
385 390 395 400

sub US seq list.ST25

Lys Leu Val Asn Tyr Leu Phe Met Arg Leu Leu Leu Ser Asn Ala Gln
405 410 415

Tyr Leu Pro Thr Tyr Ala Ser Ser Phe Lys Glu Met Pro Glu Glu Pro
420 425 430

Leu Val Leu Gly Arg Lys Arg Arg Asn Ile His Phe Ser Lys Ser Asp
435 440 445

Thr Leu Thr Asp Thr Gln Ala Asn Cys Ala Lys Val Ala Asn Glu Leu
450 455 460

Met Met Phe Ala Asn Gly Arg Val Phe Val Asp Tyr Val Tyr Pro Asp
465 470 475 480

Glu Lys Tyr Lys Asp Leu Ile Arg Ser Ser Ala Gly Gly Val Met His
485 490 495

Asn Val Ile His Ala Phe Gln Ser Met Val Asp Gln Leu Asp Trp Met
500 505 510

Ser Glu Ala Thr Lys Arg Lys Ala Ile Glu Lys Ser Met Asn Ile Ile
515 520 525

Thr Asn Ile Ala Phe Pro Asp Trp Ile Met Asp Asn Ala Lys Leu Asp
530 535 540

Leu Tyr Tyr Lys Ser Ile Thr Phe Asp Pro Thr Lys Glu Asn Tyr Tyr
545 550 555 560

Asp Ile Trp Thr Lys Leu Thr Ile Phe Asn Ile Glu Ala Gln Tyr Lys
565 570 575

sub US seq list.ST25

His Leu Thr Met Ala Thr Ala Asp Tyr Glu Glu Phe Leu Met Pro Pro
580 585 590

Gly Ile Val Asn Ala Trp Tyr Gln Pro Glu Leu Asn Thr Ile Thr Phe
595 600 605

Pro Ala Gly Ile Leu Arg Pro Pro Tyr Phe His Pro Asp Trp Pro Ala
610 615 620

Ser Ile Lys Tyr Gly Gly Ile Gly Leu Ile Ala Gly His Glu Leu Ile
625 630 635 640

His Gly Phe Asp Asp Gln Gly Val Gln Trp Gly Pro Lys Gly His Ile
645 650 655

Ser Tyr Pro Glu Lys Asn Cys Ile Gly Trp Met Asp Glu Gln Ser Thr
660 665 670

Lys Gly Phe Asn Arg Leu Ala Gln Cys Val Ile Asp Glu Tyr Ser Thr
675 680 685

Phe Cys Pro Leu Asp Asn Arg Thr Tyr Thr Pro Asn Cys Val Asn Gly
690 695 700

Ala Gln Thr Gln Gly Glu Asn Ile Ala Asp Asn Gly Gly Val His Ala
705 710 715 720

Ala Phe Arg Ala Tyr Arg Thr His Ile Ser Leu Asn Gly Pro Asp Pro
725 730 735

Gln Leu Pro Asp Arg Leu Phe Gly Gln Phe Thr His Asp Gln Leu Phe
740 745 750

Phe Leu Asn Phe Ala Gln Val Trp Cys Glu Lys Arg Arg Val Asp Asp

sub US seq list.ST25

755 760 765

Arg Leu Tyr Gln Gln Leu Met Val Asp Pro His Ser Pro Ala Met Tyr
770 775 780

Arg Val Phe Gly Thr Leu Gln Asn Tyr Pro Ala Phe Arg Ala Ala Phe
785 790 795 800

Asn Cys Pro Leu Asn Ser Arg Tyr Ala Pro Lys Asp His Cys Asn Val
805 810 815

Trp Val Pro Asn Tyr Met Pro
820

<210> 103

<211> 472

<212> DNA

<213> Ancylostoma caninum

<400> 103

acagatgaga tctctttgcc tgcgtctcgc tgtggtgctt gtcgccgtcc acgcaaaaat 60

gcagaacgtc accgtcaagg ggaccacccat ctgcaacaag aagcgaatgg ccgatgtgac 120

ggtggaactg tgggagagag acaccctcga cccaacgac ctctcgact ccaagaagac 180

ctctagggaa ggcgagtcc tcgggaaagg tggtcagaac gaagtcggct cgattgagcc 240

attcctcaaa attacacaca cctgcaatgt caagaaaccg ggctgcaaga gaatcactga 300

gttcgacatc ccgaagtga agatcgacac ggtctacgac atgacctacg tgacgctgga 360

tatcatttcc gcagtcgata aggagaagtg ctacatgaac gcgttgttt ccacggcaat 420

attttgtata gacagatgaa cattcctcc gaaaaaaaaa aaaaaaaaaa aa 472

<210> 104

<211> 144

<212> PRT

sub US seq list.ST25

<213> Ancylostoma caninum

<400> 104

Met Arg Ser Leu Cys Leu Leu Leu Ala Val Val Leu Val Ala Val His
1 5 10 15

Ala Lys Met Gln Asn Val Thr Val Lys Gly Thr Thr Ile Cys Asn Lys
20 25 30

Lys Arg Met Ala Asp Val Thr Val Glu Leu Trp Glu Arg Asp Thr Leu
35 40 45

Asp Pro Asn Asp Leu Leu Asp Ser Lys Lys Thr Ser Arg Glu Gly Glu
50 55 60

Phe Leu Gly Lys Gly Gly Gln Asn Glu Val Gly Ser Ile Glu Pro Phe
65 70 75 80

Leu Lys Ile Thr His Thr Cys Asn Val Lys Lys Pro Gly Cys Lys Arg
85 90 95

Ile Thr Glu Phe Asp Ile Pro Lys Ser Lys Ile Asp Thr Val Tyr Asp
100 105 110

Met Thr Tyr Val Thr Leu Asp Ile Ile Ser Ala Val Asp Lys Glu Lys
115 120 125

Cys Tyr Met Asn Ala Leu Phe Ser Thr Ala Ile Phe Cys Ile Asp Arg
130 135 140

<210> 105

<211> 1442

<212> DNA

<213> Ancylostoma ceylanicum

sub US seq list.ST25

<400> 105

agtgccattg ccgagggatg gctcgccttg tactgttact cgcactattt accctggctg 60
 tggccagcgt ccacaggagg acattccacc agccgcgtcg ttacgtgaag tcggtgtcgc 120
 ttctgcgtca accaacaactt cgtgaacgat tgctgggaac tggcagttgg gaggactacc 180
 agaagcaacg ctatcactac cagaagaaac ttctggcaaa atatgcggca aacaaggcgt 240
 cgaaactaca gtccaccaat gagattgacg agctccttcg taactatatg gatgcacaat 300
 atttcggcac catccaaatc ggaactccag cgcagaattt cacagtgatt ttcgacaccg 360
 gttcatcaa cctctgggtg ccgtccagga aatgccatt ctacgacatc gcgtgcatgc 420
 ttcaccaccg ctacgattct ggagcatcgt caacgtacaa ggaggatgga cgtaagatgg 480
 ctattcaata tggaactggc tcaatgaagg gcttcatttc taaggataat gtctgcatcg 540
 ccggaatttg tgctgtcgag caaccgttg ccgaggcaac gagcgagcca ggcctcacgt 600
 tcatcgctgc gaagttcgac ggaatccttg gcatggcctt ccctgaaatc tccgttctcg 660
 gtgtaccacc agtattccac acgttcattg aacagaagaa agtgccgagc ccggtgttcg 720
 ctttctggct caacagaaat cccgactcgg aactcggagg ggagatcacc ctcggtggaa 780
 tggacccccg ccgatatgtt gagccgatca catggacccc agtaactcga cgaggatatt 840
 ggcagttcaa gatggacaag gttcaaggag gatcaacgtc cattgcctgc cccaacggat 900
 gccaggctat cgctgacact ggtacttcac tgattgccgg acctaggct caagttgagg 960
 ctatccagaa attcattggt gctgagccac ttatgaaggg agagtacatg attccctgcg 1020
 acaaggtgcc ttccctcccg gagctgtcct tcgttatcga gggccggact ttcaccta 1080
 agggatgaaga ttacgtattg accgtgaaag ctggtggtaa atcgatctgc ctgtccggtt 1140
 tcatgggaat ggacttcccg gagaggatcg gagagctgtg gattcttga gacgtcttca 1200
 ttggaaagta ctacactgtc ttcatattg gccaagctcg tcttggaatt gctcaggcta 1260
 agtcagaaga tggctatccg gttggtcctg ctgttcgaag gtacaacaag ttctcggagg 1320

sub US seq list.ST25

acagcgacag tgacgaggat gatgtattca ctctctaaat aacatgtatc cacaatttgc 1380

tctaattctcg atacgtgtac cgtgtctcac gtgtttccac ttttgataaa ctgattattc 1440

tg 1442

<210> 106

<211> 446

<212> PRT

<213> Ancylostoma ceylanicum

<400> 106

Met Ala Arg Leu Val Leu Leu Leu Ala Leu Phe Thr Leu Ala Val Ala
1 5 10 15

Ser Val His Arg Arg Thr Phe His Gln Pro Arg Arg Tyr Val Lys Ser
20 25 30

Val Ser Leu Ser Arg Gln Pro Thr Leu Arg Glu Arg Leu Leu Gly Thr
35 40 45

Gly Ser Trp Glu Asp Tyr Gln Lys Gln Arg Tyr His Tyr Gln Lys Lys
50 55 60

Leu Leu Ala Lys Tyr Ala Ala Asn Lys Ala Ser Lys Leu Gln Ser Thr
65 70 75 80

Asn Glu Ile Asp Glu Leu Leu Arg Asn Tyr Met Asp Ala Gln Tyr Phe
85 90 95

Gly Thr Ile Gln Ile Gly Thr Pro Ala Gln Asn Phe Thr Val Ile Phe
100 105 110

Asp Thr Gly Ser Ser Asn Leu Trp Val Pro Ser Arg Lys Cys Pro Phe
115 120 125

sub US seq list.ST25

Tyr Asp Ile Ala Cys Met Leu His His Arg Tyr Asp Ser Gly Ala Ser
130 135 140

Ser Thr Tyr Lys Glu Asp Gly Arg Lys Met Ala Ile Gln Tyr Gly Thr
145 150 155 160

Gly Ser Met Lys Gly Phe Ile Ser Lys Asp Asn Val Cys Ile Ala Gly
165 170 175

Ile Cys Ala Val Glu Gln Pro Phe Ala Glu Ala Thr Ser Glu Pro Gly
180 185 190

Leu Thr Phe Ile Ala Ala Lys Phe Asp Gly Ile Leu Gly Met Ala Phe
195 200 205

Pro Glu Ile Ser Val Leu Gly Val Pro Pro Val Phe His Thr Phe Ile
210 215 220

Glu Gln Lys Lys Val Pro Ser Pro Val Phe Ala Phe Trp Leu Asn Arg
225 230 235 240

Asn Pro Asp Ser Glu Leu Gly Gly Glu Ile Thr Leu Gly Gly Met Asp
245 250 255

Pro Arg Arg Tyr Val Glu Pro Ile Thr Trp Thr Pro Val Thr Arg Arg
260 265 270

Gly Tyr Trp Gln Phe Lys Met Asp Lys Val Gln Gly Gly Ser Thr Ser
275 280 285

Ile Ala Cys Pro Asn Gly Cys Gln Ala Ile Ala Asp Thr Gly Thr Ser
290 295 300

sub US seq list.ST25

Leu Ile Ala Gly Pro Lys Ala Gln Val Glu Ala Ile Gln Lys Phe Ile
305 310 315 320

Gly Ala Glu Pro Leu Met Lys Gly Glu Tyr Met Ile Pro Cys Asp Lys
325 330 335

Val Pro Ser Leu Pro Glu Leu Ser Phe Val Ile Glu Gly Arg Thr Phe
340 345 350

Ile Leu Lys Gly Glu Asp Tyr Val Leu Thr Val Lys Ala Gly Gly Lys
355 360 365

Ser Ile Cys Leu Ser Gly Phe Met Gly Met Asp Phe Pro Glu Arg Ile
370 375 380

Gly Glu Leu Trp Ile Leu Gly Asp Val Phe Ile Gly Lys Tyr Tyr Thr
385 390 395 400

Val Phe Asp Ile Gly Gln Ala Arg Leu Gly Phe Ala Gln Ala Lys Ser
405 410 415

Glu Asp Gly Tyr Pro Val Gly Pro Ala Val Arg Arg Tyr Asn Lys Phe
420 425 430

Ser Glu Asp Ser Asp Ser Asp Glu Asp Asp Val Phe Thr Leu
435 440 445

<210> 107

<211> 582

<212> DNA

<213> Ancylostoma ceylanicum

<400> 107

ggtactgcag ggtttaatta cccaagtttg aggagcatgc catacctcgc attcattgtc 60

gcactactag cctgcactgt tatgtctggt cacggtcaaa tgacgggtgg attaacgaag 120

sub US seq list.ST25

caggacccca atgacacctga gcacatggcg agagcatgga aggcggcgaa aggtatcaat 180
gaggatgcat ccaacgctgg accgtaccac atgattccca ttaagattgt caaggctgaa 240
tctcaagtcg tggctgggggt tagatacata ttggaagtat tggcggcgaa atcaacatgt 300
aagaaaggac atatggctgc aacagagctt tctgcctcca actgtgaact aaaagaagga 360
ggaaaccgag ctctgtataa agtggagctc tgggagaagc catgggagaa ctttgagcag 420
ttcaatgttg agaagatccg aaatgttgct gctggcgagc aaatctaacc tgcttcttta 480
agacacctca ctgaatattg aatattttgt atgtcatgta taatacgacg cgattttttt 540
tatctcagct acttttttca ctgtgacaat tgccttctct gc 582

<210> 108

<211> 143

<212> PRT

<213> Ancylostoma ceylanicum

<400> 108

Met Pro Tyr Leu Ala Phe Ile Val Ala Leu Leu Ala Cys Thr Val Met
1 5 10 15

Ser Gly His Gly Gln Met Thr Gly Gly Leu Thr Lys Gln Asp Pro Asn
20 25 30

Asp Pro Glu His Met Ala Arg Ala Trp Lys Ala Ala Lys Gly Ile Asn
35 40 45

Glu Asp Ala Ser Asn Ala Gly Pro Tyr His Met Ile Pro Ile Lys Ile
50 55 60

Val Lys Ala Glu Ser Gln Val Val Ala Gly Val Arg Tyr Ile Phe Glu
65 70 75 80

sub US seq list.ST25

Val Leu Phe Gly Glu Ser Thr Cys Lys Lys Gly His Met Ala Ala Thr
85 90 95

Glu Leu Ser Ala Ser Asn Cys Glu Leu Lys Glu Gly Gly Asn Arg Ala
100 105 110

Leu Tyr Lys Val Glu Leu Trp Glu Lys Pro Trp Glu Asn Phe Glu Gln
115 120 125

Phe Asn Val Glu Lys Ile Arg Asn Val Ala Ala Gly Glu Gln Ile
130 135 140

<210> 109

<211> 528

<212> DNA

<213> Necator americanus

<400> 109

gaaaagcctc catagtcattg ctcaagctcg ttgcactcgt ttgcctgggt gcaatctgct 60

tcgtcagg accacaagga cccctccgt tctgcaaag tgcctcagcg gctgtcaac 120

aagacttga caagctcttc gtcaatgctg gctccaagac tgatgcagaa atcgacaaa 180

ttgtccaaga ttgggttggc aaacaagatg catccatcaa gaccgcattc gatgcgttcg 240

tgaaggaagt gaaagccgct caagcgcaag gtgaagctgc ccatcaggct gctatcgcca 300

agttcagcgc agaggccaaa gcggctgatg ccaagctgag cgcaattgcg aacgacaggt 360

cgaagacaaa cgcgcaaaag ggagctgaga tcgactcggg actcaaggga cttcctcaa 420

atgtccgcac agagatcgaa aacgcatga aaggataaga agtctctatt ttgtatatat 480

gaaccgataa atatgcacaa taataaaaaa aaaaaaaa aaaaaaaa 528

<210> 110

<211> 146

<212> PRT

<213> Necator americanus

sub US seq list.ST25

<400> 110

Met Leu Lys Leu Val Ala Leu Val Cys Leu Val Ala Ile Cys Phe Ala
1 5 10 15

Gln Gly Pro Gln Gly Pro Pro Phe Leu Gln Ser Ala Pro Ala Ala
20 25 30

Val Gln Gln Asp Phe Asp Lys Leu Phe Val Asn Ala Gly Ser Lys Thr
35 40 45

Asp Ala Glu Ile Asp Lys Met Val Gln Asp Trp Val Gly Lys Gln Asp
50 55 60

Ala Ser Ile Lys Thr Ala Phe Asp Ala Phe Val Lys Glu Val Lys Ala
65 70 75 80

Ala Gln Ala Gln Gly Glu Ala Ala His Gln Ala Ala Ile Ala Lys Phe
85 90 95

Ser Ala Glu Ala Lys Ala Ala Asp Ala Lys Leu Ser Ala Ile Ala Asn
100 105 110

Asp Arg Ser Lys Thr Asn Ala Gln Lys Gly Ala Glu Ile Asp Ser Val
115 120 125

Leu Lys Gly Leu Pro Pro Asn Val Arg Thr Glu Ile Glu Asn Ala Met
130 135 140

Lys Gly
145

<210> 111

<211> 1672

sub US seq list.ST25

<212> DNA

<213> Necator americanus

<400> 111

gaaaggttta attacccaag tttaggatg aagattgccc tggttgttct gctgtagtc 60
gcctacgcaa attctgcgga catcttcaga actgaatttg gagctaaaat aaaagcagag 120
gcggataaaa gtaagacgaa actaaatata tcctctcttc ttcaagtccg tgggaaattc 180
ctcaagttaa gacaacagat caaggagagc ttagctctga ccccggaacg aaaagagttg 240
ttgcataagt tgatgcagaa attagtacac atcaaaaagg atcatgttca taagggtggt 300
gactcaatcg atgaaatcaa taagaagggt ggaatgtcag atctgctcta cgatggtgat 360
atggttctaa cgaaagagca agccgaggaa atggttagcg atatcgacgg aagtggaagc 420
aaccgtgcaa agcgtcaagc gtatcgtaac aaactttatc cgaaaacact ttgaccgat 480
ggagtatatc attattcca tcctagtga acgaatagca tgcgaagtgt gttcctgaaa 540
gcagcaaaag aatggagctc tcaaacgtgt atcgatttcc atgaggatgt ggttggaatg 600
ggcccaaaca ggatcaaggt ttcaaagag aaaggttgtt ggtcgatggt tggacgactc 660
cctcgccac aggagcttcc gttgggaaga ggatgtgata cgattgccac agcacaacac 720
gagatcggcc atgcgctggg attctccac cagcaggcta gacacgatcg cgatgactac 780
attgtattta attcagagaa tgtagtgccg cgatatctgg atcaattcaa gaaacagagc 840
aaagaaaca acgataatta cggattaact tatgattacg gaagcaccat gcagtacgga 900
tcgaccagcg gatcccaaaa tggaaaacct acaatggtgc caaagatcc taaatatata 960
gaaaccctgg gatcacctt cattgcattc tacgatttac tggcaataaa tacgcactac 1020
aaatgtcttg agaaatgcga taataatggg gcacaatgca aaatgggtgg attccctaatt 1080
ccaagagatt gctcaaatg catttgtccc agtggatacg gtggcgctac atgtgaccag 1140
aaacctgaag gatgtggtga agtacttgaa gcaacgaagg aggctaaaac cctcaaaagt 1200
gaaattggag ataaaagtgc aggagatgag gacagagagg acatgaccaa gtgttactat 1260

sub US seq list.ST25

tggatcaagg caccggaagg atcgaaagtt gaggttaaga tcgtaaacct agctaaaggt 1320
cttgccattg atggatgcag atattgggggt gtggaaatta aaactcagga ggatcaacgt 1380
gcttccgat acagattctg cgctcccgaa gatgctggcg tcactttgga gtcgcactcg 1440
aatattgtcc ctataatagc gtccaataga cacggctcta ctgaattga attacagtac 1500
cgaatcgtat aattctgcgt gaccaacgct tctcctaaga gacgagaaag ttctgcaaca 1560
atactttatt catgtataac aatataggag agtttttctt agtagaagta ctttctttgt 1620
tggttctcca gaaataaacg atttccatgc aaaaaaaaaa aaaaaaaaaa aa 1672

<210> 112

<211> 494

<212> PRT

<213> Necator americanus

<400> 112

Met Lys Ile Ala Leu Val Val Leu Leu Leu Val Ala Tyr Ala Asn Ser
1 5 10 15

Ala Asp Ile Phe Arg Thr Glu Phe Gly Ala Lys Ile Lys Ala Glu Ala
20 25 30

Asp Lys Ser Lys Thr Lys Leu Asn Ile Ser Ser Leu Leu Gln Val Arg
35 40 45

Gly Lys Phe Leu Lys Leu Arg Gln Gln Ile Lys Glu Ser Leu Ala Leu
50 55 60

Thr Pro Glu Arg Lys Glu Leu Leu His Lys Leu Met Gln Lys Leu Val
65 70 75 80

His Ile Lys Lys Asp His Val His Lys Gly Gly Asp Ser Ile Asp Glu
85 90 95

sub US seq list.ST25

Ile Asn Lys Lys Val Gly Met Ser Asp Leu Leu Tyr Asp Gly Asp Met
100 105 110

Val Leu Thr Lys Glu Gln Ala Glu Glu Met Val Ser Asp Ile Asp Gly
115 120 125

Ser Gly Ser Asn Arg Ala Lys Arg Gln Ala Tyr Arg Asn Lys Leu Tyr
130 135 140

Pro Lys Thr Leu Trp Thr Asp Gly Val Ile Tyr Tyr Phe His Pro Ser
145 150 155 160

Ala Thr Asn Ser Met Arg Ser Val Phe Leu Lys Ala Ala Lys Glu Trp
165 170 175

Ser Ser Gln Thr Cys Ile Asp Phe His Glu Asp Val Val Gly Met Gly
180 185 190

Pro Asn Arg Ile Lys Val Phe Lys Glu Lys Gly Cys Trp Ser Met Val
195 200 205

Gly Arg Leu Pro Arg Pro Gln Glu Leu Ser Leu Gly Arg Gly Cys Asp
210 215 220

Thr Ile Ala Thr Ala Gln His Glu Ile Gly His Ala Leu Gly Phe Phe
225 230 235 240

His Gln Gln Ala Arg His Asp Arg Asp Asp Tyr Ile Val Phe Asn Ser
245 250 255

Glu Asn Val Val Pro Arg Tyr Leu Asp Gln Phe Lys Lys Gln Ser Lys
260 265 270

sub US seq list.ST25

Glu Thr Asn Asp Asn Tyr Gly Leu Thr Tyr Asp Tyr Gly Ser Thr Met
275 280 285

Gln Tyr Gly Ser Thr Ser Gly Ser Gln Asn Gly Lys Pro Thr Met Val
290 295 300

Pro Lys Asp Pro Lys Tyr Ile Glu Thr Leu Gly Ser Pro Phe Ile Ala
305 310 315 320

Phe Tyr Asp Leu Leu Ala Ile Asn Thr His Tyr Lys Cys Leu Glu Lys
325 330 335

Cys Asp Asn Asn Gly Ala Gln Cys Lys Met Gly Gly Phe Pro Asn Pro
340 345 350

Arg Asp Cys Ser Lys Cys Ile Cys Pro Ser Gly Tyr Gly Gly Ala Thr
355 360 365

Cys Asp Gln Lys Pro Glu Gly Cys Gly Glu Val Leu Glu Ala Thr Lys
370 375 380

Glu Ala Lys Thr Leu Lys Ser Glu Ile Gly Asp Lys Ser Ala Gly Asp
385 390 395 400

Glu Asp Arg Glu Asp Met Thr Lys Cys Tyr Tyr Trp Ile Lys Ala Pro
405 410 415

Glu Gly Ser Lys Val Glu Val Lys Ile Val Asn Leu Ala Lys Gly Leu
420 425 430

Ala Ile Asp Gly Cys Arg Tyr Trp Gly Val Glu Ile Lys Thr Gln Glu
435 440 445

sub US seq list.ST25

Asp Gln Arg Ala Ser Gly Tyr Arg Phe Cys Ala Pro Glu Asp Ala Gly
450 455 460

Val Thr Leu Glu Ser His Ser Asn Ile Val Pro Ile Ile Ala Phe Asn
465 470 475 480

Arg His Gly Ser Thr Glu Phe Glu Leu Gln Tyr Arg Ile Val
485 490

<210> 113

<211> 759

<212> DNA

<213> Necator americanus

<400> 113

acttcaagcg atgttccgctc ctgctactgc cgtccttcta ttgttggccg cgtccagcac 60

atttgctgga ttttcgatg atgttgagg ctaccacagt ggtgtgggag atttttcac 120

aaagcagttc aacaatgtga aggatctttt tgctaaagat caagatactc ttgagaagaa 180

tatcaatctg gtaaaggatc tattgattgc cattaaggag aaggctaaga tgctggaacc 240

gatggccaac gaggctcaga agaagacatt agggcagggtg gacaactatc tcaatgaagt 300

tcaacagttc ggcgatcagg tagccaagga gggttctacg aaatttgagg agaacaaagg 360

gaaatggcag caaatgtga acgatatctt cgagaaaggt ggactggaca gcgtgatgaa 420

gttgctcaat ctgaagtcg gcggtcgctg cacgttagcc gctgcactcg tcgctcccg 480

tgtgctcgcg ctcatccgct aattcacttc taccgccgcc gactactgta gttaccctg 540

tgccgtgtg tgatatgtgg atttgtgcat gatgtgtatc tatgattgt gattttttt 600

tctctgtac ttccatgaat tcagctctgg tattctgaga cggaccaaca tctccgcagt 660

actttttgt attgttatca tcaccgtaat cctgtgactg gcgtaaaatg ttagttttc 720

cgataaaata catttcgaaa aaaaaaaaaa aaaaaaaaaa 759

sub US seq list.ST25

<210> 114

<211> 163

<212> PRT

<213> Necator americanus

<400> 114

Met Phe Arg Pro Ala Thr Ala Val Leu Leu Leu Leu Ala Ala Ser Ser
1 5 10 15

Thr Phe Ala Gly Phe Phe Asp Asp Val Gly Gly Leu Pro Ser Gly Val
20 25 30

Gly Asp Phe Phe Thr Lys Gln Phe Asn Asn Val Lys Asp Leu Phe Ala
35 40 45

Lys Asp Gln Asp Thr Leu Glu Lys Asn Ile Asn Leu Val Lys Asp Leu
50 55 60

Leu Ile Ala Ile Lys Glu Lys Ala Lys Met Leu Glu Pro Met Ala Asn
65 70 75 80

Glu Ala Gln Lys Lys Thr Leu Gly Gln Val Asp Asn Tyr Leu Asn Glu
85 90 95

Val Gln Gln Phe Gly Asp Gln Val Ala Lys Glu Gly Ser Thr Lys Phe
100 105 110

Glu Glu Asn Lys Gly Lys Trp Gln Gln Met Leu Asn Asp Ile Phe Glu
115 120 125

Lys Gly Gly Leu Asp Ser Val Met Lys Leu Leu Asn Leu Lys Ser Gly
130 135 140

Gly Arg Cys Thr Leu Ala Ala Ala Leu Val Ala Pro Val Val Leu Ala
145 150 155 160

Leu Ile Arg

<210> 115

<211> 5

<212> PRT

<213> Artificial

<220>

<223> GMR is derived from restriction site in the cloning vector; NS
are first two amino acids of mature Ac-ASP-2

<400> 115

Gly Met Arg Asn Ser

1 5

<210> 116

<211> 6

<212> PRT

<213> Artificial

<220>

<223> motif introduced by the choice of restriction sites used in
cloning of the construct

<400> 116

Glu Ala Glu Ala Glu Phe

1 5